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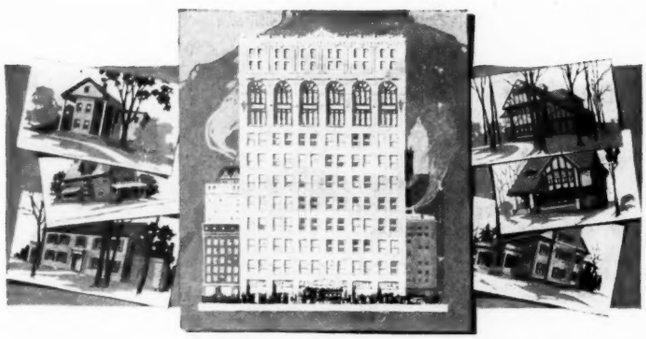


Houses are built to suit an individual's taste. But business buildings conform to recognized standards of efficiency.

Motors, too, are designed either to suit an individual's taste or to meet universal requirements.

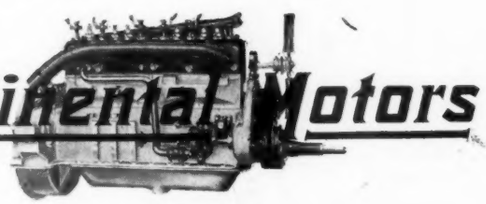
Of the manufacturers of motor cars and trucks in America, some still build their own motors. Each retains faith in his own genius or that of his designer; each naturally thinks his motor the best. But the variations are wide; few manufacturers accord to any other the sincere flattery of imitation. Their motors continue to reflect their personal preferences.

But more than one hundred and fifty manufacturers now use one or more models of the Continental Motor. Many of these formerly built their own motors. The combined experience of them all has been weighed, sifted, and summed up in the Continental Motor. Because it thoroughly satisfies the universal requirements of utility, convenience and service, it qualifies, without challenge, as America's standard motor.

CONTINENTAL MOTORS COMPANY

OFFICES: Detroit, Michigan
FACTORIES: Detroit, Muskegon

Largest exclusive motor manufacturers in the world.



The World's Largest Signal Business

Stewart Warning Signals are only one part of our business yet that one department alone does more business than any other exclusive warning signal manufacturer in the world.

Speaks pretty well for the quality of the Stewart Signals.

"It will pay you to see that the car you buy is equipped with Stewart Products"

The Stewart-Warner Speedometer Corporation
Chicago, Ill., U. S. A.

Stewart

Motor Driven Warning Signal

$6

The Automobile

Vol. XXXV New York—Thursday, August 24, 1916—Chicago No. 8

Consolidated Now Abbott Corp.

Moving from Detroit to Cleveland and Increasing Stock from $500,000 to $1,250,000

Detroit, Mich., Aug. 21—The Consolidated Car Co., manufacturer of the Abbott-Detroit cars, has been reincorporated under the name of the Abbott Corporation, and the capital stock has been increased from $500,000 to $1,250,000. The larger stockholders in the concern are F. C. Hull and A. W. Gardiner of this city.

It has been definitely decided to remove the business of the Abbott Corporation to Cleveland, Ohio, where a factory has already been secured which will have ample facilities for the increasing of production over the fifteen to twenty-car-a-day output possible in the present factory here. Difficulties in getting materials and the labor situation here are given as two reasons for the change, although Messrs. Gardiner and Hull have material financial interests in Cleveland, according to M. J. Hammers, vice-president, and this move will, therefore, serve to group the holdings of those principally interested and provide the best of financial and commercial support for the Abbott concern. The personnel of the company will remain the same, with the exception that an executive officer will be appointed to succeed C. L. Lewis, who recently retired from the presidency to become affiliated with the General Engineering Co.

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U. S. Truck Capital Now $1,000,000

Cincinnati, Ohio, Aug. 21—The capital stock of the United States Motor Truck Co., this city, was increased from $300,000 to $1,000,000, at the recent stockholders' meeting, to take care of rapid growth of its business and to greatly increase its factory facilities.

This increase in stock was divided into both preferred and common, the preferred is cumulative 7 per cent, and participates in the earnings with the common up to 10 per cent.

The directors declared the regular annual dividend of 7 per cent on the preferred, and placed quite a large sum to the credit of surplus from the excess earnings.

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Metcalf a Simplex Director and Vice-President

New Brunswick, N. J., Aug. 21—Morris Metcalf was elected a director and vice-president of the Simplex Automobile Co., at a recent directors' meeting. He will be in charge of all the commercial departments, including sales, body, service and publicity.

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Large Peerless War Truck Order

New York City, Aug. 18—One of the Allied governments has placed through Gaston, Williams & Wigmore an order for 2400 Peerless trucks, delivery to commence immediately. Delivery will be made at the rate of from eighty to 100 trucks a week until late in 1917.

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Iowa Rubber Co. Formed

Davenport, Iowa, Aug. 17—The Iowa Rubber Tire Co., capitalized at $1,000,000, was formed here recently, with a number of local men as incorporators. Chief among those interested are: J. W. Bettendorf, J. R. Lane and Judge J. W. Bollinger. A plant will be erected, either in Davenport or in Bettendorf, the suburb of this city, in the near future.

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Browne Heads Anderson N. W. Division

Detroit, Mich., Aug. 18—L. M. Browne, formerly of the eastern sales division of the Anderson Electric Car Co., this city, has been placed in charge of the northwest sales division, with headquarters in Minneapolis.

Timken Buys Out David Brown

Worm Gearing Concern Merged with Axle Company—Myers Leaves Organization

Detroit, Mich., Aug. 21—The Timken-David Brown Co., this city, the majority of the stock in which was originally owned by the Timken-Detroit Axle Co., has been bought out entirely by the Timken-Detroit company, and the manufacturing operations will be consolidated under the management of the axle company. That portion of the Timken-David Brown stock which previously was not held by the Timken Axle Company was owned by David Brown & Sons, Huddersfield, England, and the new move divorces the two entirely. The Timken-David Brown Co. has always been regarded as a part of the Timken factories here, being under the same roof. It manufactures worm gearing for motor trucks and power transmissions, and the gear generating machinery was brought over originally from Huddersfield.

Coincident with the announcement of this merging of the Timken units comes information that Cornelius T. Myers, formerly chief engineer, and later manager in charge of engineering, manufacturing and sales of the Timken-David Brown Co. has severed his connection with the concern, disposing of his interests to the Timken-Detroit Axle Co. Mr. Myers, it is announced, will again take up consulting engineering in this city, making a specialty of motor truck, tractor and worm gearing applications to all kinds of power transmitting machinery. Myers has had an active engineering experience, having been mechanical engineer for the General Motors Co., and chief engineer of the General Motors Truck Co. He is a prominent member of the Society of Automobile Engineers.

Ford Agencies Increase Rapidly in Every City

Unrestricted Territory Plan Occasions Formation of Many Agencies—Ex-Salesmen of Ford Branches and Others Not Heretofore Connected with Ford Branches Have Become Retailers

NEW YORK CITY, Aug. 21—With the adoption of the new merchandising policy by the Ford Motor Co., hundreds of Ford salesmen have set up for themselves and in other instances have formed partnerships with their co-workers. In still other cases, they have readily obtained positions with the many new Ford agencies that are being established.

The unrestricted territory plan has occasioned the formation of many agencies even by those not heretofore connected with Ford branches and many garagemen, equipped to give service, have become Ford retailers. The change is most noticeable in those cities where there have been Ford branches. In towns where representation has been by a dealer only, new agencies as yet have not been established in any great number, and sometimes not at all.

One of the greatest changes will be in America's biggest city, New York. In Manhattan it is estimated there will be twenty-five or thirty and in Greater New York, which includes Brooklyn, Manhattan, the Bronx and Staten Island, fifty or more.

In Chicago, where there will be about thirty Ford dealers who will handle 10,000 Ford cars during the coming year; none of them will be allowed more than 500, and the minimum, according to the plan, will be ten.

In St. Louis nine new agencies are to be formed, making ten, including the Johnson Auto Co., the original Ford retailer. Several of these agencies have held openings, served lunch and entertained the public.

While additional appointments may be made, there are already in Milwaukee ten and in the suburbs two. In Wisconsin and upper Michigan, the business in the immediate future will be handled by 254 dealers of whom 238 are in Wisconsin and sixteen in upper Michigan. Many of these have been handling the Ford. The branch had thirty salesmen, most of whom have already made new connections.

In Louisville, Ky., four dealers have already been appointed, and in Lowell, Mass., the agency has been given up by Stephen L. Rochett of the Lowell Motor Mart, and has been taken over by Harry Pitts of the Pitts Auto Supply Co.

In Connecticut the number of dealers has been increased from twenty-two to thirty-eight. The Elmer Automobile Co. has controlled the territory and states that it plans to operate much as in the past. It has headquarters in Hartford with branches in Manchester, New Britain, Willimantic, Torrington and Winsted. John M. Butler, manager of the Elmer company said he expected to dispose of 28,000 cars during the next 12 months. Dealers, who heretofore have had more than one town, will concentrate on one town, which means an increase of 73 per cent in the number of dealers. It is stated that in Columbus, Ohio, the Ford branch, has, where possible, given preference to its former sales force. In fact, oustide of one dealer who formerly handled the county, every Ford agency in Columbus will be controlled by former Ford salesmen. There will be eight in all in the city and quite a few in the county, although it is said that most of the country dealers will be unchanged.

Ten of the fourteen Philadelphia salesmen have left the branch to open agencies.

Conditions similar to these exist throughout the United States, and while the unrestricted territory plan will vitally affect some dealers and distributers, there are instances in which the actual operation of the plan will be less revolutionary than its theory indicates. This belief seems to hold true especially with regard to country districts where agencies equipped to give service are not as numerous as in the cities.

Richmond, Va., will have at least four firms acting as Ford retailers. The factory representative will only sell the Ford automobiles, trucks and tractors at wholesale. It is stated that at least four agencies will be opened in Norfolk.

The Ford company in Pittsburgh has been besieged with applications for new agencies. The company has so far established nine agencies covering all parts of the city. It is expected that at least three or more agencies will be placed there.

Up to the present time about eight agencies will handle Ford cars in Washington, D. C. Applications for five other prospective agents are being considered. The fact that any dealer who wants to handle Ford cars will be limited in territory to the District of Columbia has come as a district surprise, as it was generally understood that under the new selling plan there would be no restrictions as to territory.

Five sales shops will be opened in Dallas, Tex. Three branches have been established in Baltimore, Md. Several of the Baltimore newspapers have been carrying blind advertisements asking prospective Ford buyers, who desire some special consideration to communicate. It is thought among the trade in that city that these cars will be sold on the payment of $100 deposit and $25 monthly. It is expected that there will be about twelve agencies in Baltimore. At present there is a little hesitancy on the part of prospective agents in the matter of forming companies on account of the guarantee to sell a car for every working day in the year. There is little doubt that the Ford company will dispose of about 5000 cars during the fiscal year to Aug. 1, 1917.

Twelve agencies are lined up in Minneapolis for Ford cars to replace the branch selling agency. Nine of these are closed and three are in abeyance. In some instances as high as three salesmen have gone with an agency. Contracts in the country remain as territory line-ups and are unchanged. In the city the minimum for cars is twelve.

Conditions will be somewhat similar in St. Paul. There will be eight to ten agencies, possibly more.

Parent Company Abandons Repair Business

DETROIT, MICH., Aug. 22—Supplementing the exclusive publication in last week's issue of the details of the new Ford selling plan, which is revolutionary in the automobile industry, complete information as to the workings of the new method of marketing Fords has now been secured.

The plan is really very simple in its workings, and requires only that the prospective dealer have financial responsibility and a garage at which he can take care of service for the car. The dealer can interpret the word service in any way he sees fit. Possibly Ford will continue to give service for some months yet at the various branches and assembly plants throughout the country, but when a man comes for service he will be told that that time is the last from the Ford company direct.

The number of cars that a dealer may secure for the year is based upon an estimate of his possibilities of selling them. There is a regular discount per car, and if the dealer meets the estimated number of cars he has arranged for per

month he will get a bonus on each car at the end of the fiscal year. If, for instance, a dealer contracts for twenty-five cars a month for the year and takes this number, his discount per car is increased by a bonus payment.

The number of agencies in any city or locality will be based upon the population and experience in that locality. In Detroit the maximum number is to be twenty-five agencies, and this will vary for other points. Already some eighteen dealers are either selling or getting ready to take contracts.

The contract limits the dealers to selling cars in Detroit, Highland Park and Grosse Point, which are really all a part of Greater Detroit. Thus, in any locality the dealers will have to confine themselves to certain selling fields as per their contracts. Dealers must do their own advertising.

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American Vanadium Co. Sold for $7,000,000

PITTSBURGH, PA., Aug. 23—The American Vanadium Co., this city, which owns 92 per cent of the known deposits of vanadium and which sells very largely to the makers of high-speed tools and automobiles, has been taken over by eastern capitalists for $7,000,000. J. L. Replogle, Kuhn, Loeb & Co., Harrison Williams and others, are at the head of the syndicate.

Mr. Replogle, now vice-president and general manager of the company, will be made president after the conclusion of the sale. J. J. Flannery, head of the present company, will become chairman of the board.

A year ago American Vanadium stock was considered to be worth $152 a share. The last sale reported was made at about $600. The syndicate is offering $1,000 a share, of which $650 will be paid in cash and $350 in 6 per cent notes, or in the stock of the company. The new company, which will retain the name of the old, will have a capital of $13,500,000, made up of $5,000,000 of 7 per cent preferred stock, $6,000,000 of common, and $2,500,000 of 6 per cent short-term notes.

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426,892,673 Barrels Petroleum in 1915

WASHINGTON, D. C., Aug. 19—Petroleum production in 1915 amounted to 426,892,673 barrels, exceeding the 1914 production by 28,194,307 barrels, or 7 per cent. Nineteen-fifteen was the most successful year of production in the history of the petroleum industry. The bulk of the increase in 1915 came from the United States and Mexico, though Russia, Argentina and Japan recorded significant gains.

The marketed production of crude petroleum in the United States in 1915 was 281,104,104 barrels of 42 gal. each.

20-Cent Gasoline Predicted

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Fuel Continues Recession Throughout Country—Middle West Prices Lowest

NEW YORK CITY, Aug. 22—Gasoline continues its rapid drop in price. No logical reason is given for the sudden shift. All that is definitely known about it is that the investigation of the Federal Trade Commission had nothing to do with the reduction. Some authorities state that the recession is the outcome of the digging of new wells.

It is believed that gasoline prices will reach the low level of 20 cents a gal. in practically every section of the country within 2 weeks. Prices have been falling steadily throughout the West and Middle West during the past week. Figures collected from all parts of the country show that automobile owners of the Middle West, from Chicago to Denver, are paying the lowest price at present for gasoline. Chicago and Des Moines quoted the lowest price, 17½ cents, and the average is 18 to 19 cents. These prices average 2 cents below the rest of the country. The Standard Oil Co. has reduced prices in St. Louis to 17.9 to 16.9 at filling stations. The independents in that city also commenced quoting the same price. The first drop in gasoline prices in the Rocky Mountain section occurred on Aug. 15, when a cut of 1 cent was made. Oil companies there are wholesaling to garage and filling stations at 22 cents a gal. Columbus prices have been cut a cent to 22 by the Standard Oil Co.

A reduction of 1 cent per gal. for the lower tests of gasoline was made effective in Milwaukee and throughout Wisconsin and Upper Michigan this week. The Standard Oil Co. and the independents authorized the drops at the same time. Present quotation at filling stations or delivered in Milwaukee, is 17.6 cents per gal. on the Red Crown grade. The independents' lowest test, marked 59 deg., is now 17.6 cents, tank-wagon basis, or 18.6 cents, filling stations. Higher tests, or grades running from 65 to 74 deg., are not affected by the reduction. Practically all retailing of gasoline in Milwaukee is now done directly by the Standard and independent companies through filling stations. Garages which sell gasoline for the most part do so on commission for the big wholesalers and thus are designated as filling stations for these companies. Garages connected with agencies for cars do not want gasoline trade because it is wholly unprofitable.

The Texas Co. to-day announces reductions of 1 cent a gal. tank-wagon basis, to conform with cuts by competitors in the territories named, as follows: Illinois, to 17½ cents; Minnesota to 18½ cents; Missouri to 16.9 cents minimum, 17½ maximum; Florida to 22 cents minimum, 22½ cents maximum; Georgia, 22 cents minimum, 25 cents maximum; Louisiana, 18½ cents minimum, 20½ cents maximum; Mississippi, 20½ cents minimum and 22½ cents maximum; Alabama, 22½ cents minimum, 26 cents maximum; and Ohio, 21 cents.

The Eastern section of the country has also been favorably affected the shift in prices, though the average price being paid is somewhat higher than in the West. Pittsburgh prices, retail, have been cut 2 cents a gal. within the last 4 days, quotations prevailing at from 22 to 23 cents. Detroit prices, tank wagon basis, have been reduced 1 cent to 18 cents. Buffalo owners are paying 23 cents and in Albany prices are ranging around 25 cents per gal. New Yorkers are paying 23 cents a gal. in 1000 gal. lots. Gasoline in New York City may now be had at the Socony stations at 23 cents a gal., though, representing a drop of 3 cents since the beginning of last week. Louisville prices have received a further cut of 1 cent to 20 cents wholesale.

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Gasoline Report Expected Soon

WASHINGTON, D. C., Aug. 19—The Federal Trade Commission met again to-day to consider the gasoline phase of its oil investigation that has been in progress for several months. It announced that the report on gasoline would be issued shortly, but those in close touch with the commission say the report will not be submitted before the adjournment of Congress. That the commission was co-operating closely with the Department of Justice also was learned When the investigation was first inaugurated, such co-operation was planned; any specific complaints in regard to gasoline prices were to be turned over to the trade commission and anything of interest to the Department of Justice was to be noted.

G. C. Todd, assistant attorney general in charge of anti-trust prosecutions, met with the commission to-day and listened to some of the information it has collected to report to Congress on the causes for the rise in the price of gasoline. The Department of Justice has kept an eye on the companies into which the old Standard Oil Co. was dissolved under the supreme court decree several years ago, but never has discovered evidence to show that decree has been violated. Mr. Todd declined to discuss the value of the evidence collected by the trade commission, but it was understood that so far the Department of Justice had not determined whether there was new information in government hands to warrant proceedings.

ACCESSORIES In South America

No. I

With 30,000 U. S. A. Cars in Argentina There Is No Doubt As to the Great Value of Field

By David Beecroft

"IT is hard to do business with the accessory manufacturers in the United States of America. I carry a stock of accessories here worth $50,000 United States gold. I sell the majority of my accessories to be paid for in 60 and 90 days. I cannot sell for cash. If I try to the buyer goes to three of four other places in the city."

Antonia Prado, owning and conducting one of the largest supply houses in San Paulo, Brazil, so summed up his attitude with regard to our accessory makers. Señor Prado only said what several other supply houses in different parts of Brazil and Argentina told me at different times. There was a startling unanimity of criticisms from many different cities within the course of a few weeks. They all told the same story:

"It is hard to do business with United States of America accessory firms."

There is literally no reason for such a verdict being lodged against us. These South American accessory dealers and supply house people want our accessories. They want our accessories because in many instances they cannot get any from France, England, Germany, Belgium, Italy and the other European countries they have been in the habit of buying from.

Again: They want our accessories because to-day there is a lot of U. S. A. cars through these South American countries, and it is imperative that owners of these cars secure necessary accessories.

Speedometer Shortage

Take a few examples: The majority of Ford cars sold in Argentina, Uruguay, Chile and Brazil are sold without speedometers. A car owner on the Argentine pampas is just as anxious to know how far he goes in a day as a motorist in New Jersey or Connecticut. You have more need for an odometer in Argentina and Brazil than you have in New York State or Pennsylvania. In Argentina, through the country or camp, you travel uncharted roads and have every need for the speedometer and the odometer. The same is true in other countries such as Chile, Uruguay and Brazil.

Try to buy U. S. A. speedometers and you cannot buy them in many places; in fact, it is the exception if you can buy them. We tried in four different cities outside of Buenos Aires in Argentina and could not. These supply houses generally buy from the three or four large houses in Buenos Aires, but complain that they are not able to get supplies in quantities. They may be able to get three or four or perhaps a dozen speedometers, but that does not in any sense meet the requirements. Two of the supply houses in Buenos Aires showed quite a don't-care attitude toward our cars and accessories. One house has strong German sympathies and the other leans strongly to the French. The third and perhaps the largest is very favorable to U. S. A. goods and is eager for information on the accessory field in U. S. A.

¶ This is the first of three articles outlining what accessories there is a good market for and what business principles should be followed in the business.

Delays on Shipments

This speedometer example can be applied to other lines of our accessories. Here is example No. 2:

While in Rosario, a city of 400,000, and 6 hr. by train from Buenos Aires, the following information was given before I had an opportunity of getting properly seated in the office:

"On Jan. 16 I placed an order for U. S. A. accessories through a New York shipping house. Under date of March 22, I got an acknowledgment stating the goods were being shipped by same steamer and would arrive by the end of April. To-day it is June 5 and I have not heard of the goods. I am out of stock and cannot get any in Buenos Aires. I am sending a second order to this same firm. I do not know when my first order will arrive, but I must have goods and am placing a second order and I may have to place a third order before I get the first order of goods. The U. S. A. cars are selling around here and I need these accessories."

This is a story you will get in seven or eight different cities in Argentina. It is a story I got in Uruguay, and it is similar to stories I got at two cities in Brazil.

Before trying to answer why it is hard for the supply house men and accessory men in Argentina and Brazil to do business with us, let us see if the possible field in Argentina is worth while. We take Argentina first because it is the greatest field for U. S. A. cars, trucks, tractors and accessories in South America.

There are many accessories which we manufacture that will prove popular there, and are proving good sellers to-day. In perhaps twenty supply houses in ten or twelve different cities in three different countries we went over a good percentage of the accessory stock on hand to see what U. S. A. goods were being carried and also to ascertain what lines were proving good sellers. We found a fair repre-

sentation of U. S. A. goods and saw many articles that are big sellers. We found many lines of French and German goods and also many English, Italian and Belgian lines.

Thirty Thousand Cars in Argentina

From a careful canvas of all sources there are approximately 30,000 automobiles in Argentina. Here are some figures on automobile imports that very nearly give this total:

Argentine Total Automobile Imp.	U. S. A. Automobiles Imported
Prev. to 1905..3,517 cars imported	1905 to 1909..... 333 cars
1905 to 1909... 244 cars imported	1910..... 217 cars
1910...1,581 cars imported	1911..... 489 cars
1911...2,461 cars imported	1912..... 708 cars
1912..4,281 cars imported	1913.....1,296 cars
1913..5,515 cars imported	1914.....2,100 cars
1914..3,004 cars imported	1915.....1,400 cars
1915..1,838 cars imported	1916.....4,444 cars
1916..4,444 cars imported	

These 30,000 cars, of which 8000 are U. S. A. cars, require many lines of accessories that call for frequent renewal. They call for certain supplies not falling in the line of accessories that can only be supplied by U. S. A. to-day. These 30,000 cars call for certain garage supplies that can really only be obtained from this country at present. The accessory market for these 30,000 cars exists, thanks to no special efforts we have taken, but due to the misfortunes of others. These 30,000 cars are literally asking for our accessories and yet we are not even making it easy for the supply house people there to do business with us. This is their outspoken verdict.

What does 30,000 cars mean as a possible accessory field?

Hand Horns in Demand

Some of the best U. S. A. sellers are hand horns, soaps, body polishes, spark plugs, speedometers, batteries, vulcanizers and dry cells.

Hand horns are very good sellers, but we rarely saw more than one or two different makes. Each of the 30,000 cars in Argentina is a prospective market for a hand horn. The field is large enough to warrant our large horn makers starting after. They should at least get their feet firmly on the ground. Very often when you asked where the dealer bought the goods he remarked, "From a New York exporting house." As to why he did this the answer came that so many of the accessory houses were hard to do business with. They had not Spanish stenographers, they did not know how to properly pack goods for ocean shipment and there were other excuses. These dealers were willing to pay an exporting house 2.5 per cent more for the goods solely because it was easier to do business in that way than with the manufacturer.

If our accessory manufacturers are asking themselves if it is worth while going after export business or not, let them not forget that during the fiscal year ending June 30, 1916, practically 8.5 per cent of our entire automobiles manufactured were exported. Where these exported cars go our accessories should follow. We are to-day becoming an exporting nation of such proportions that our makers must seriously consider this export question. We have a big export business to Europe, Canada, Australia, South America, West Indies, Africa and Asia. We can scarcely afford to close our eyes to the magnetism that our cars exert in these countries, and it is poor business if our accessory makers do not at least try to follow in the wake of our car builders in the export field.

Requests for Polishes

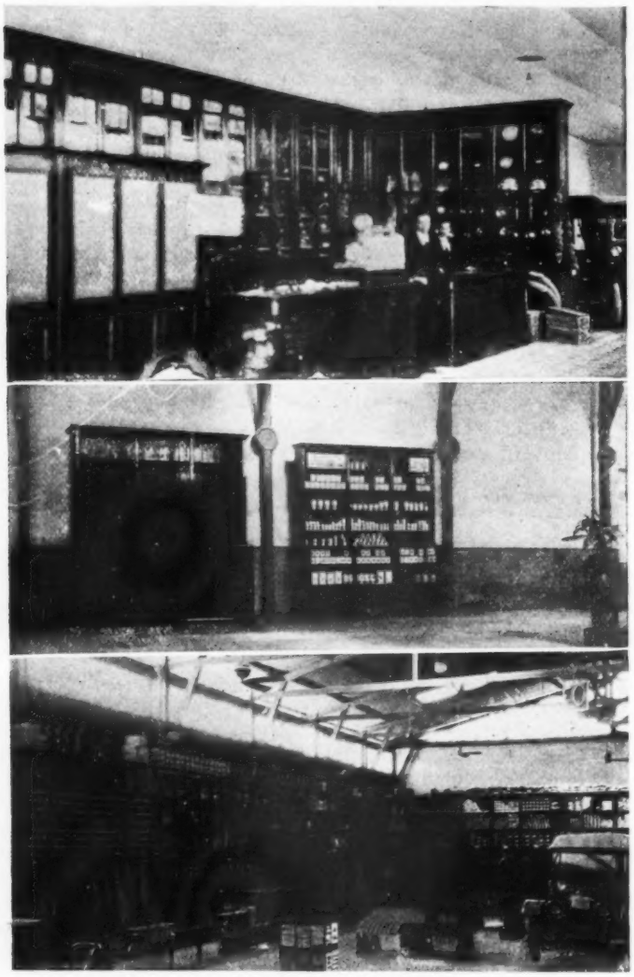
Metal and body polishes are good sellers in South America, where many of the chauffeurs are required to wash and polish their own cars. It is very common to do this, particularly where the cars are kept in individual stalls under lock and key. The driver is entirely responsible, and if a single scratch appears he is looked to. This means a very wide market for polishes. One or two supply house men wanted such in litre cans to retail at 75 cents, United States gold.

There is a brisk market for soaps and hand cleaners. Where each chauffeur becomes a body polisher it is essential that he have plenty of soap. More soap is needed per car per month than with our system of washing where four or five men in one garage wash 100 cars. We need soap for four men, whereas South America needs it for 100.

Spark Plugs Very Strong

Spark plugs are fine sellers. In nearly every supply house you see three or four makes of U. S. A. plugs, three or four French makes, one or two German, a couple of English and perhaps one Italian. You meet with Champion, A-c, Bethlehem, Mosler, Grossman, Splitdorf and some others. One criticism applies to nearly all of our plugs sent to

Goodyear tire establishment in Buenos Aires, Argentine Republic. This is typical of the high-grade accessory quarters and also illustrates the Spanish tendency of the South American architecture. The wide street should be noted. This is also typical of Buenos Aires



Top—Cadillac agency supply department in Cordoba, Argentine. Center—Valentine varnish display in Cordoba accessory store. Lower—U. S. A. accessories on shelves in a Cordoba shop

Argentina and Brazil, namely, that prices are marked on the cases. The same pasteboard boxes seen in Chicago or Kansas City supply houses are seen in Buenos Aires, Rio, Sao Paulo. This is bad. If a spark plug sells for $1 in New York it is a certainty that it cannot sell for $1 in Buenos Aires. The sign $ is the same in Buenos Aires that it is in New York, but the $ in Buenos Aires stands for only 44 cents of United States gold. In Buenos Aires that plug may sell for $4. You readily see the difficulty of a dealer trying to convince the buyer to pay $4 when the sign in plain figures on the pasteboard box is $1.

Our spark plug people who do business direct with Argentina should leave all prices off their goods. You should get special boxes with all reading in Spanish and leave the price off. Germany learned to do this some years ago and very often when you see German plugs they are in neat pasteboard boxes with the reading in Spanish. The Argentines like such. It makes sales easier. For Brazilian trade have the prices left off and print the reading in Portuguese.

The South American dealer has his troubles getting spark plugs into the country. Here is what a large supply dealer in Cordoba, Argentina, told me, and substantiated it by documents. Cordoba is a city of 140,000 located in the central part of Argentina and a night's ride by train from Buenos Aires.

The dealer has constant troubles with the custom authorities: He buys them in cases of a dozen, and out of each case there is stolen in the customs two plugs. He pays $5 United States gold in New York for the dozen and has to get his profit out of the ten reaching him. He has to add $3.52 for freights, customs, insurance, etc., so that the plugs cost him practically 85 cents United States gold each. He sells them for $1.32 United States gold each in order to break even.

This custom house trouble is not new in many of the South American countries. Very often several of such small articles are missing and the custom officials seem so strongly entrenched in their positions that nothing remains but to accept the inevitable. While in Rio de Janeiro a U. S. A. citizen had a 3-lb. box of chocolates forwarded from a friend in New York. It took nearly a week to get the box through the customs. Three different custom authorities were engaged in the job, and when the chocolates finally arrived the entire top layer was missing. There was no use complaining. The trouble is not local to automobile accessory concerns, but unfortunately is a serious one in South America, and one that must be settled sooner or later.

Need Tire Vulcanizers

Reverting to the accessory field, there are many other U. S. A. lines that you already see in South America, but which have been purchased through New York exporting houses and the makers may yet be ignorant of the fact that their goods are on sale in South America. You ask every supply manager where he buys his goods and he generally replies that it is through an exporting house. It astounds you to think that some of our largest accessory houses are not selling direct to these large South American dealers. Selling direct would give their goods better representation and the maker would be much closer to the market.

Our tire vulcanizers are not well represented. Every one of the 30,000 cars in Argentina has tire troubles, and they are just as careful of their tires as we are, in fact, more so. There is a good market for small vulcanizers, such as chauffeurs can use. There is also a good market for shop vulcanizers, for nearly every garage is well prepared to look after tire repairs. We saw in Cordoba one of the most up-to-date vulcanizing departments that could be found, the goods all coming from a U. S. A. house.

Weed chains are strong sellers in every part of South America where U. S. A. cars are sold. Many Ford dealers sell the chains as a part of the car equipment. The same is true with several of the other makes. Our cars are generally going into the camp or country where roads are not good in many places, but where the cars must go nevertheless. Chains are an essential. Oversize tires are generally sold. Every Ford dealer is stocked with Weed chains, but in many places their stocks were running low in June.

Ford slip covers are popular and good sellers. All South American countries are favorably disposed toward slip covers for seats. They are universal in the cities and the demand for them in the country gives good promise.

Gear Blanks Needed

Forge companies can do a fairly good trade in gear blanks of all sizes. Many of the large dealers in Argentina and Brazil are well equipped with gear cutting machines. You will see some of the finest German, Swiss and French machines, but too few of ours. These gear cutters will handle any size of spur or bevel used in an automobile. The dealers found it good business to fit up with such machinery.

There is a good market for steel stock in all bar sizes. The large accessory supply houses handle it.

In every supply house you will see spring clips of all sizes and similar forgings for cars. It is impossible to mention what accessories are not needed in South America. The same accessories that we use they will have to use. There did seem to be a dearth of shock absorbers, particularly the cheaper types that are in such general use on Ford cars in

U. S. A. With bad roads the rule in Brazil and Argentina it is certain that the shock absorber business will have a good field.

Paint and varnish concerns have a relatively strong field. There is a great deal of car repainting in the cities, but not so much in the camp. One supply house dealer had a large stock of Valentine goods, and had them well displayed in a special show case.

Brake Lining Needed

There is a good market for various makes of U. S. A. asbestos-copper brake facing and facings of other compositions. You meet with one or two makes, but frequently find that a supply house is short of many sizes. Keeping an adequate stock is a problem. The supply house man orders only fair-sized lots because he pays cash or sometimes cash against document in New York. In order not to keep his money tied up too long his purchases are not so large as they should be. Selling on 90 days' time will solve that difficulty and result in larger sales. The U. S. A. maker can charge, perhaps, 8 per cent extra for the time, and in addition will find his sales increasing.

We found very general requests for priming cups and grease cups. Solely because you have to cross the equator to get to Argentina is no reason to imagine that it is always hot there. Argentina has its seasons just as we have. It has its winters, and they are cold. We were there in May and June during their fall, for their seasons are directly opposite to ours, and although we wore our New York winter overcoat we were colder than in New York in February. It gets very cold in Argentina, and you feel it more so because the buildings are not heated. Garages are not heated, and naturally a car gets very cold, making priming cups an essential. There was a shortage of them in one or two places.

Grease cups of all sizes are needed. For European cars the metric thread is best, but for U. S. A. cars our standard threads will do. It would be beneficial to us if we used the metric threads on all of such parts, as it would simplify our export trade.

Big Bearing Field

Our bearing concerns are not so well represented as they should be. One of the surprises that meet you when looking through large accessory supply houses and in many garages is the large stock of bearings carried. I have seen two shelves over 12 ft. long each piled nearly 1 ft. high from end to end and for nearly a foot in width with various sizes of French, English, German, Swiss, Italian and Belgian ball bearings. You soon see the reason. Argentina is 3 weeks from Europe, and it is necessary to keep very large stocks. We found New Departures in one or two places; we found Hyatts stocked in a few places, but looked for several other makes that should have been represented, because of U. S. A. cars being sold, but could not find them. Our ball and roller bearing makers should get into the South American field. They will have to supply bearings for the U. S. A. cars, but there is no reason why our ball-bearing makers should not be supplying for a percentage of the European cars. The field is there. We must get after it.

Demand for Lamps

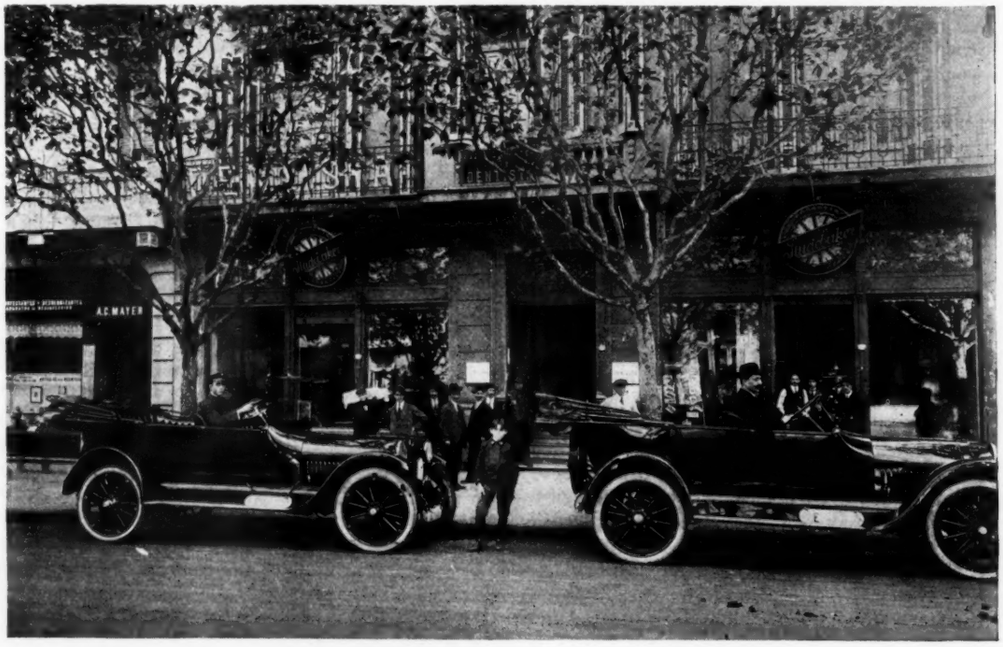
A brisk demand was noted for hand electric repair lamps. So many of the European cars use acetylene lighting that the electric repair lamps are good sellers. There is in this connection a good possible market for the individual electric searchlight which we fit to the frame of the windshield and operate by hand. The Argentines are fond of attachments, and their poor roads would make such a lamp very attractive. Lamps are heavily stocked in all supply houses.

Several requests were made for top-covering materials which are cut and ready to be used in recovering such standard models as the Overland, Ford, Buick and others. Tops are not given good attention in Argentina; in fact, all of our cars going into the camp get rough usage. Sometimes they are never under cover for months. To make a speedy top-recovering job these tops, cut ready to be applied, are much in demand. The life of a top in Argentina is considerably less than the life of one in our own West.

Ford Dealers Good Sellers

Nearly all Ford dealers carry a large stock of accessories, including two or three tire lines. The Ford dealer in Cordoba, Argentina, has the whole side of his shop occupied with one large showcase with glass front. It is filled with Ford spare parts and all of the accessories he can get. He was short of Ford accessories in June. He can sell 200 Fords per year if he can get them, and as all cars arrive without speedometers he was particularly anxious to get such lines. He does not want speedometers that read in miles per hour, but they must read in kilometers per hour.

(*To be continued next week*)



Studebaker agency along a South American automobile row. In a great many instances in South America the dealer in cars will also carry a wide range of supplies both for automobiles and other purposes. The illustration herewith shows an agency which is devoted to the sale of Studebaker cars and which is typical of the case where an American maker has secured a firm foot-hold

British Idea of Inexpensive Car Vastly Different from American

Suggested Chassis for Quantity Production in England After War Has Many Novel Points—Elimination of Moving Parts Studied with Exceptional Thoroughness

OUR British contemporary, *The Automobile Engineer*, has in its July issue a suggested specification for a car which the author considers could be produced in England after the war to sell for $800. In the light of American manufacturing experience there are many points which are highly debatable: for instance, it is stated that if a four passenger car could be sold for $800, the two-passenger roadster ought not to cost more than $750, which suggests a misconception as to the relative cost of bodywork made in a modern fashion. However, the article is not concerned so much with the details of cost as to show the general way in which cost can be cut and to "convey some impression of the *kind* of chassis that is required, as it is feared that the average British manufacturer starting on the production of a quantity car will inevitably end up by producing something of a quality in excess of what is required for the market and the purpose for which the chassis is intended."

As such it certainly creates thought. The authorship is not stated, but it is easy to see that American practice has been studied carefully, has even been taken to greater lengths than any engineer in America has yet dared to carry it. Another striking point, wherein the chassis differs from American practice, is its lightness of detail. The enormous overhang on the front axle and the almost flimsy construction of the rear axle would be suitable to the smooth highways of the old world, no doubt, but hardly in a rougher country.

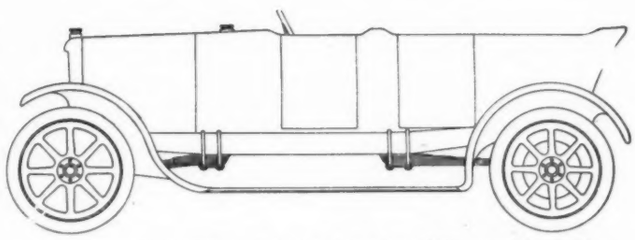
Doubt About Spring Suspension

The author himself is obviously doubtful about the spring suspension. With the points of attachment so close together the "spring base" of the car becomes so small that rolling and plunging would seem almost certain faults. It is rather surprising that this suspension should even be considered as practicable in a country where high speed is the rule. There would seem to be possible advantages in shortening the wheelbase somewhat and reversing the rear springs so that they are attached to the rear end of the frame and point forward to the axle, as was done with marked success on the baby Peugeot, which has the same type of shackleless springs. Even a cross spring at the rear would seem better than the type suggested.

However, it is not fair to criticise without quoting the author's own description of his ideas which follows:

"The main points that have been borne in mind in the chassis lay-out given are economy in detail manufacturing costs, economy from the point of view of erecting shop costs, and economy of attention when in use. The last-named objective is a most important one, and to carry out this scheme all possible 'attention-requiring' points must be eliminated. No greaser or oilcan hole must occur in the chassis. On this account fixed cantilever springs fore and aft are adopted. These are rigidly clipped to both axles and frame, so that the use of shackles, spring bolts, etc., is avoided, and the suspension thus embodies no moving parts.

"For steering connections the O.S. bearings or bearings of this type are suggested. The O.S. bearings are American productions, and are of a nature that is different from ordinary British practice. The wearing or bearing surfaces consist of compressed graphite impregnated material that needs no attention in use. In this way steering or other likely parts are made self-lubricated, or lubricated statically instead of dynamically.



Exterior appearance of British idea of an $800 quantity production car

"The engine, clutch, gear, and steering formed an integrally oiled unit in the original lay-out, but from the viewpoint of production economy it was deemed advisable to separate the steering gear, the advantage of self-lubrication of this unit scarcely warranting the extra complexity involved in the casting. This is a debatable point, and it may still be found advisable to combine the parts in the manner suggested. Both foot and hand brake actuation is by cable—an arrangement that gives at once compensation and freedom from pin joint and other 'attention-needing' spots.

"By reference to the general arrangement of the chassis it will be seen that, for side members, two straight channel pressings are proposed. They are of good deep section at the center, tapering away at either end, and are set up at the rear to allow for back axle movement. Being without curves or formed dumb-irons, economy is effected in die costs, and also in production prices, as the shaping of the dumb-iron bend on a side member adds considerably to its cost; moreover, even when the channel has been bent and completed, the actual dumb-iron brackets, either castings or stampings, must be provided.

"Four cross members are used, the rear cross member being strongly reinforced by angle plates to insure stability endways. At the front of the chassis the two engine arms, by being made of particular strength, might be employed to serve as a cross member, so that the extreme front cross channel might conceivably be eliminated altogether. This cross member, instead of carrying the starting handle, has a starting handle bracket that is blanked off by a cap fitted in front, as is usual where a starting motor is installed. In the event of the front cross channel being eliminated, an extension of the timing gear cover casting could be arranged to form the starting handle bracket. If this scheme were adopted, it would be as well to carry the engine feet as far forward as possible on the crankcase. The steering box is attached by the engine foot bolt, an arm on the box clamping between the engine arm and the frame block. This enables the steering column angle to be readily set for two or four-seaters. A steering column bracket on the dash insures rigidity.

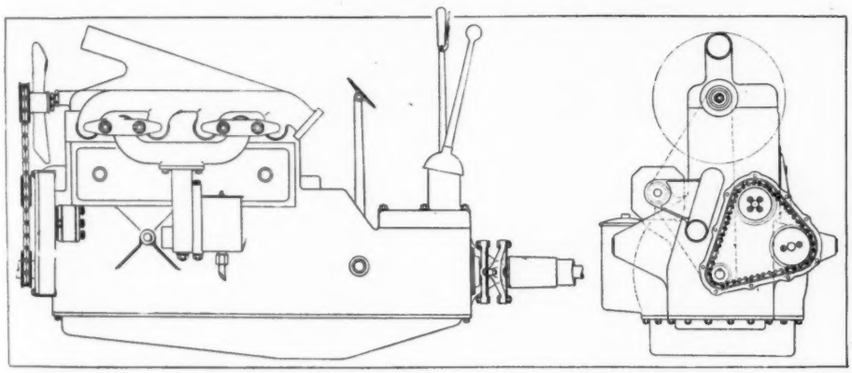
"The springs—fixed cantilevers front and rear—are bolted direct to the underneath of the channel section by clips circling completely round the side members and springs. The extremities of the springs are, as previously mentioned, clipped rigidly to both axles, half the spring end being turned down and a corresponding turn up on the spring seating being used to form a natural register in both directions to avoid any necessity for doweling or machining of spring seatings in order to obtain location.

"This system of suspension offers many advantages from the viewpoint that has been adopted in this particular lay-out, as not only does it give extremely low cost in manufacture and erection, but it is also in line with the minimum of attention and trouble ideal upon which this, and for that matter most future cars, will be laid out. There being no spring pins, spring bolts, shackles, greasers, etc., the suspension should last indefinitely, provided the springs themselves are wrapped up. While considering this system, it is as well not to overlook the fact that it possesses one or two rather obvious disadvantages. If the system is adopted without tie or radius rods, as shown in the drawings, it will evidently be necessary to have as light an engine as possible. The lateral stability of such a system is poor, and too much mass directly over springs of the type shown is inadvisable, and would inevitably make the front of the car roll. A further point is that, having one coupling point only to the frame, breakage of a spring might prove more disastrous than in the ordinary semi-elliptic lay-out. Much depends upon quality of material and design, and with care such an arrangement should be safe enough; it has been employed on one or two chassis of light build, and is apparently satisfactory.

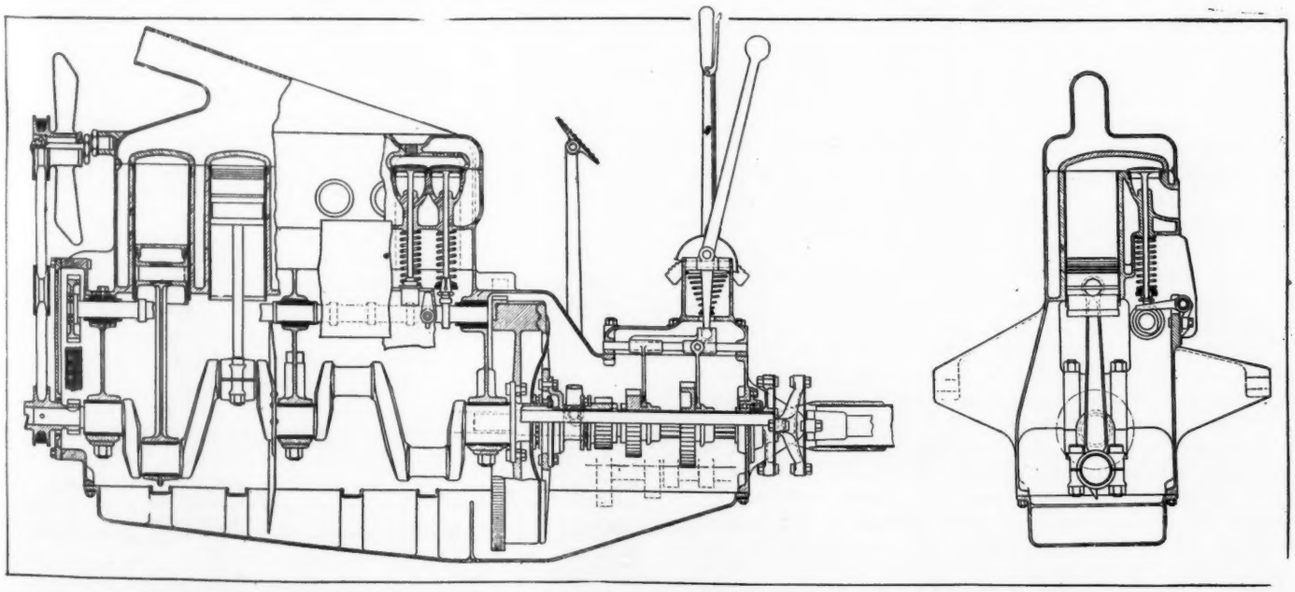
"The lay-out in these pages is for a 3⅛ in. by 4¾ in. engine, but evidently the general scheme is applicable to an engine of anything about this size; 3½ in. by 4¾ in. would probably be better, but it seems, however, that 3⅛ by 4¾ in. certainly under present and possible future persecution will be all that any ordinary human being will be able to pay for; moreover, fuel prices and probable shortage even after the war will make small capacity engines essential. The engine body and cylinders are a one piece aluminum casting with the gear box also. Separate cylinder linings and valve seats will, of course, be necessary with the material proposed, but aluminum gives so many advantages in other ways that it will probably not be found an unpractical arrangement, assuming normal material prices. This proposal, particularly with the large size casting outlined, is admittedly an optimistic one; whether or not we have a firm of founders in this country capable of tackling such a job is an open question. The proposal, however, is not an impossible one, and with a large output would be worth while. In any case, slight modification of the casting—such as the provision of a vertical joint somewhere in the flywheel or clutch region—would make the casting problem much simpler. This arrangement, nevertheless, would add to machining and erecting costs, and on that score would be best avoided.

"Aluminum pistons would be used, the gudgeon pin being probably fixed in the connecting-rod and turning in the piston.

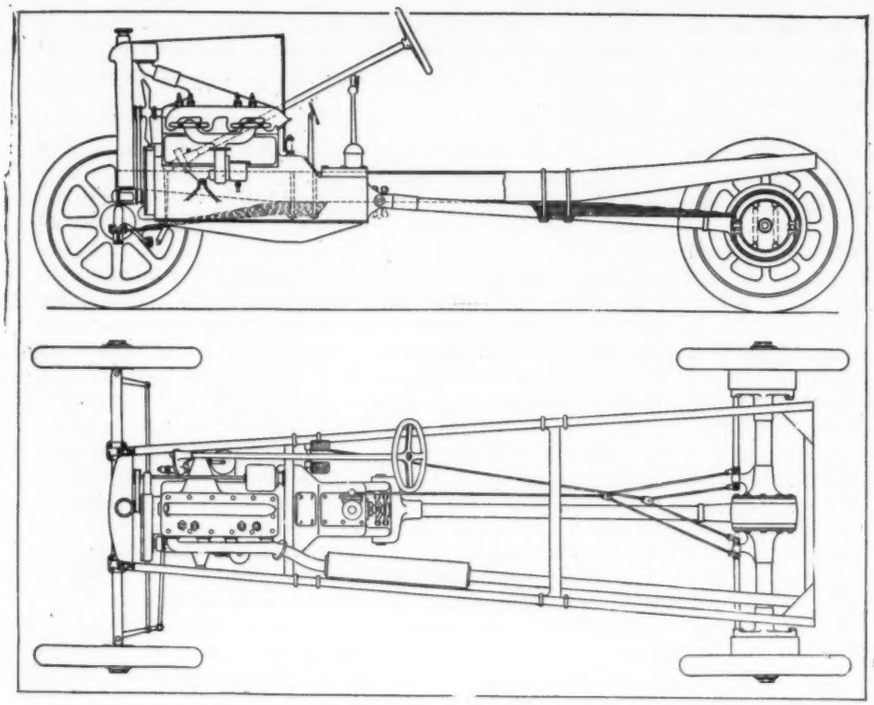
A detachable head with integral water outlet that can also be of aluminum is suggested. A chain-driven camshaft is proposed, the chain extending in triangular form, as seen in the front end view, to drive also the distributer. For chain adjustment the distributer, and its driving wheel, slide in the timing gear case, the joint face on the outside of the casing being covered by the flange on the distributer bearing. Slots in this flanged bearing permit of the necessary sideway movement.



Exterior of unit power plant to be used in a British low priced large production automobile



Section through motor suggested as suitable for a low priced car to be manufactured in British shops



Elevational and plan views of a low priced chassis, suggested for British production

"The water inlet pipe to the cylinders from the bottom of the radiator is incorporated in the main casting, and will be seen alongside the timing gear in the end view of the engine. On the side of the inlet water pipe the dynamotor driving spindle bracket is shown—also cast on—an arrangement that would probably make more for complexity than simplicity. The better plan would probably be to bolt this on as a separate part. The water pipe butts against the pipe on the bottom of the radiator, a rubber ring being employed, making a joint against the faces or ends of the pipes in place of the usual hose pipe type of connection.

"Obviously the main casting is sufficiently complex as it stands, and for this reason the inlet and exhaust branches are separate, being attached to the cylinder by dogs and clamping set-screws.

"With an aluminum cylinder block there is not much option as to the matter of making the exhaust branch separate or otherwise, as aluminum is scarcely suited to be the first receiver of hot and unexpanded exhaust gases.

"With a view to economy, it is suggested that the usual valve pressers and guides be done away with and a rocking lever system of presser be substituted, an adjustable end to the valve being used in place of the usual method of valve adjustment. This arrangement lends itself to economical construction, as all the rocking levers can be threaded on a tube with tube distance pieces, the whole assembly being then clamped against the front of the casting.

"With the general lay-out of gear and clutch shown it is evidently of vital importance to reduce to a minimum the length of the mainshaft. It is quite possible that the length of the unsupported mainshaft in the arrangement shown will produce a noisy box. On the other hand, with a view to economy, it is important to keep the number of bearings to a minimum, and on these accounts a compact narrow clutch is imperative; further, all increase in clutch length and movement means increase of shaft length, so that the reasons for the arrangement shown are fairly evident. It is difficult to arrange an economical design of the ordinary single plate clutch, the actuation for clutches of this type being usually fairly costly.

"The splitting up of the cone surfaces into steps will increase the speed of engagement in direct proportion to the number of steps, a clutch with a large number of steps giving practically instantaneous clutching if arranged with the cone usual angle. On this account the angle of the clutch cone becomes much greater than usual, the angle in the clutch illustrated to transmit the necessary power coming out at about 60 deg. to the horizontal with the leverages adopted, and using a spring requiring reasonably light pressure at the pedal pad for disengagement.

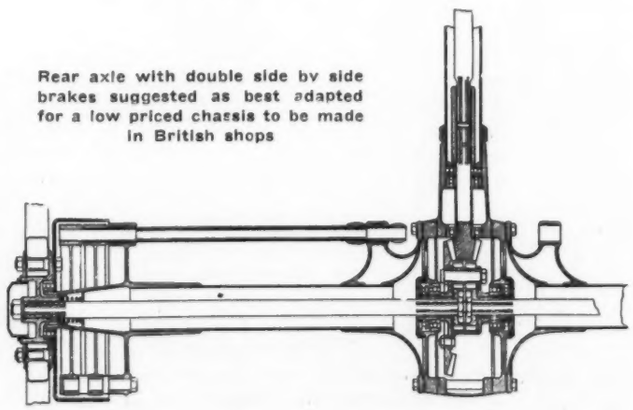
"Three speeds and reverse are suggested for the gearbox, with all sliding wheels arranged on the mainshaft. The selector, or striking lever, gate and selector mechanism, are all in a single casting that forms the gearbox cover.

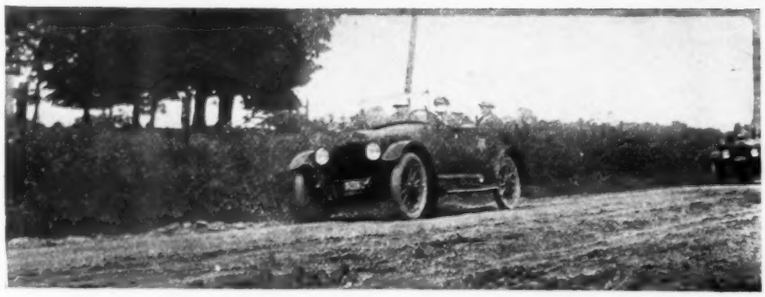
"With regard to oiling details, considerable economy over the usual systems must be effected, and it is suggested that for the purpose of oil delivery a large pressing or spinning should be attached to the crankshaft center to form an oil thrower. Oil is lifted from the central portion of the sump, and thrown up into the delivery well or collector, seen on the off side of the engine body. This pot or collector forms also the oil filler, and has been arranged so that oil delivered into it is filtered, and feeds the four troughs under the big ends. Oil will inevitably be delivered by the thrower faster than it can run to the troughs, and a higher level overflow from the collector delivers to the gearbox, whence the oil flows back to the sump over the central dividing web into the crankcase, maintaining a constant level in the gearbox, and circulation to all parts of the system without much expense, complexity, or the use of an oil pump. The usual oil wells would be provided for the camshaft and crankshaft bearings to hold the splashed oil.

"With regard to arrangements at the rear, it is suggested that a torque tube be employed sliding in a T-piece of broad base that fulcrums on pins through brackets on the gearbox.

"The rear axle lay-out, as shown, is necessarily very tentative; that is to say, in certain particulars it depends so much on what is obtainable in the way of large-sized pressings. On this account the outer casing construction is extremely difficult to settle. That shown in the drawing is a large diameter tube with castings at each end, the one being the differential box end or cover and the other the axle tube end and spring seating. Both brakes are on the rear wheels,

Rear axle with double side by side brakes suggested as best adapted for a low priced chassis to be made in British shops





Measuring gasoline and on the road on the King test

a necessity from the point of view of economy in detail and erection, and wire cable is employed for the actuation of both brakes, as this gives a ready and inexpensive compensation, and eliminates the brake cross-shafts, brackets, etc., etc., with advantages both from the viewpoints of production economy and minimum of lubrication attention in use. Arrangement could be made to conduct a portion of the rear axle lubricant to the brake actuation shafts and fulcrum pins, so that no outside attention was required.

"It was originally intended to include among the published drawings an axle scheme without a differential. In the low-priced chassis the differential does not really justify itself, it having been repeatedly proved that tire wear on an axle without a differential is little, if any, in excess of that which obtains with a rear axle of the usual type. It is suggested that this is due to the fact that with a differential gear scraping of the tires results from wheel spin when one wheel only bumps, a happening that is avoided with a solid axle.

"If the 'differentialless' axle were adopted it would be necessary to arrange a clutching system to enable one wheel to revolve free if required, a small hand lever, similar to the gear change lever, and located in front or at the rear of the brake and hand levers, and actuating a dog clutch, being a likely arrangement. Thus, when the car was moved by hand, as in garage maneuvering, the one wheel would be released. It could also be freed even in the smaller maneuverings under power, such as backing into awkward corners, etc., etc. The saving in unsprung weight, resulting from an arrangement such as is outlined in the foregoing, is a strongly favorable point, apart from great saving in cost.

"The axle lay-out illustrated is still rather complex, and little in advance of the usual schemes, although a certain economy in fitting and erecting costs has probably been effected by arranging the differential box with separate sides, so that the bevels and differential gear may be erected and adjusted before the axle tubes are bolted up. In any case it seems impossible to effect sufficient economy, if the usual scheme with differential is followed at all, so that the rear axle without differential, or even a substitute, appears to be the correct arrangement in the circumstances. With a dog clutch, as already outlined, a practical working scheme should be evolved."

King Economy Test Over the Road

From Pittsburgh to Milwaukee Under Touring Conditions Average Over 14.6 m.p.g.

CHICAGO, ILL., Aug. 19—A fuel economy test under actual touring conditions over the roads from Pittsburgh to Milwaukee has just been concluded by a King eight-cylinder, seven-passenger, stock touring car. The average was 14.658 miles per gallon of gasoline and 962.4 miles per gallon of oil. The run was in charge of F. E. Edwards of the Technical Committee of the American Automobile Association accompanied by A. A. A. observers.

In his application for a sanction Artemus Ward, Jr., president of the King company specified a car owner fuel test to be run under touring conditions. The association was asked to conduct the test in such a way as to determine the mileage that an owner would secure in touring and not a maximum economy record. No change in the equipment of the car was made.

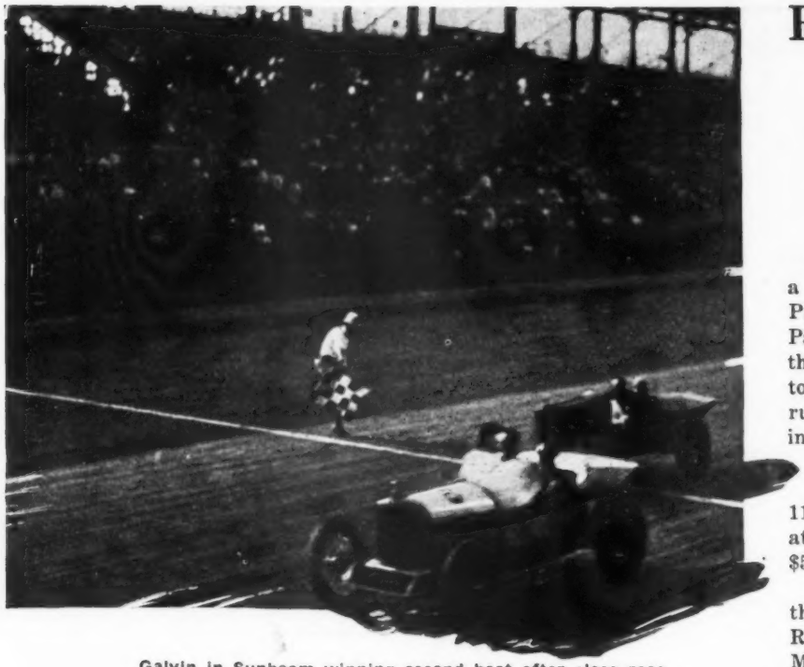
The car left Pittsburgh at 8 a. m., Aug. 15 and travelled to Milwaukee by way of Youngstown, Cleveland, Toledo, South Bend and Chicago, covering all sorts of roads during the 616.4 miles. An average speed of 19.44 m.p.h. was made including stops and 22.67 m.p.h. excluding stops. Gasoline was measured to the fraction of an ounce. The car was the regular eight-cylinder King, 3-in. bore, 5-in. stroke, Ball & Ball carbureter, nozzle size 70, Atwater Kent ignition, Ward-Leonard electric units, Carter gravity feed, Champion plugs and Firestone tires. Mobiloil B was used and a Boyce Moto-Meter and a spot light were fitted. The car weighed 4250 lb. with full passenger load.

Summary of Stock King On-the-Road Fuel Test

From Pittsburgh, Pa., to Milwaukee, Wis.
Miles traveled, 616.4.
Gasoline consumed, 42 gal. 7 oz.
Oil consumed, 2.5 quarts.
Water consumed, 1 gal.
Miles per gallon of fuel, 14.658.
Miles per gallon of oil, 962.4.
Miles per gallon of water, 616.4.
Tires—finished on Pittsburgh air.
Miles per hour, including all stops, 19.44.
Miles per hour, excluding all stops, 22.67.
Number of stops at controls, 6; duration, 2 hr. 50 min.
Number of stops between controls, 7; duration, 1 hr. 41 min.

Some Comments

Regarding the combined casting for engine and transmission, it has not been the experience of either European or American engineers that the one-piece transmission and en-



Galvin in Sunbeam winning second heat after close race

Resta Easily Wins Speedway Grand Prize

Ralph De Palma Out Early in Race—Struggle for Second Place in Finals on Chicago Track

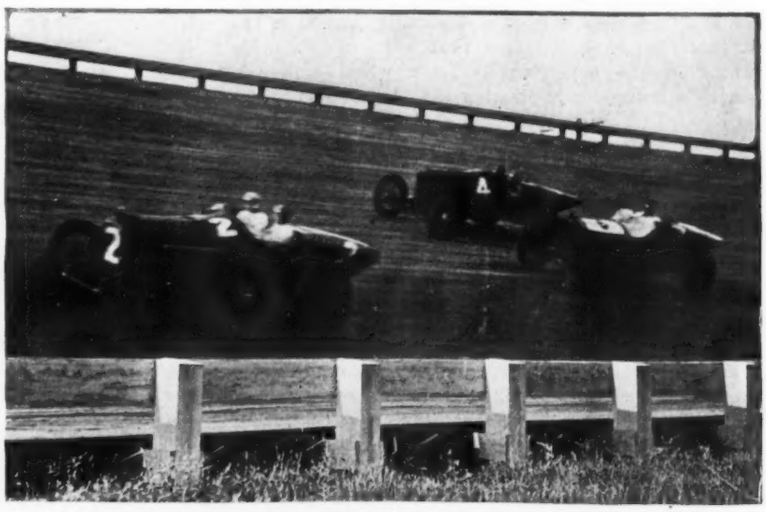
CHICAGO SPEEDWAY, Aug. 19—Dario Resta had a walkaway in the American Speedway Grand Prize Race held here to-day. With Ralph De Palma in his Mercedes out of the race early in the day, no competition remained to push Resta to anything like a close contest. The race was run in heats of 20 miles, the winners participating in the 50-mile final. Resta drove against a field that he apparently did not fear and after taking the first heat of 20 miles in 11 min. 42.6 sec., he easily won the 50 mile final at an even 100 m.p.h. The afternoon netted him $5,000 of the $10,000 prize money.

It was a close contest in the first heat for three laps between De Palma and the Peugeot of Resta. Then a cylinder head on De Palma's Mercedes blew out and after that it was all Resta. The fight for second place in the first heat was between Galvin in the Sunbeam and D'Alene in a Duesenberg who finished respectively second and third. Resta's average for the 20 miles was 102 m.p.h.

One of the best battles of the afternoon was found in the second heat, which Galvin took in the Sunbeam in 11 min. and 37.72 sec., or about 5 sec. faster than the heat won by Resta. Galvin's speed was 103 m.p.h. Lewis in the Hoskins made Galvin give his mount all it had in it and there was a margin of less than a car length between Galvin and Lewis at the finish. Galvin, Lewis and D'Alene ran one, two, three all through the second heat.

Lewis took the third heat in 12 min., 7.3 sec., his average being 99 m.p.h. D'Alene and Buzane, both driving Duesenbergs, were second and third, respectively all through the third heat. The fourth heat went to Buzane in 12 min. and 27.68 sec., his speed being 96.5 m.p.h. D'Alene crowded the little Greek hard, but could not head him. Milton brought his Duesenberg to the pits at the end of 14 miles in the fourth heat and Christiaens docked his Sunbeam at the end of 10 miles. The Belgian was having considerable trouble to

(*Continued on page* 335)



A close brush on the banked turns of the Chicago board track

gine is as cheap as the divided units with a bell housing attachment. The large castings are much more difficult to make, more troublesome to handle, and more costly to machine than the separate parts. The extra labor in assembly consists merely of doing up a dozen nuts, and the greater ease of putting in the gear and clutch parts separately from the engine assembly much more than offsets the saving in coupling the two portions.

One of the most interesting points is the suggestion for a torque tube as this would certainly cost more than would a Hotchkiss drive with half elliptic springs. The half elliptic springs, being lighter, would be intrinsically less costly.

Aluminum Powerplant

Another thing which is well worthy of note is the use of aluminum for the power plant, cylinder, crankcase and gearbox. This is absolutely new to British practice and is quite foreign to American cheap car convention. It means that the lower cost of upkeep obtained by lighter weight is thought so valuable as to offset the great saving possible by using cast iron instead of aluminum.

However, the most interesting thing of all is that this idea of what an $800 car should be contrasts so strongly with the sort of car an American manufacturer could put on the British market at this figure. Any manufacturer who in America is making a car selling for $650, could start a British factory on a 20,000 output, and reproduce his American model for $800 or less, quite easily. Putting it another way American production men and American engineers could show a British factory how to make something far less unconventional for the same money.

The author constantly mentions the fact that the car should not be finished too highly, that it must have no needless money lavished upon it, which means that he does not intend to give a better finish than that customary on the $650 class of American car. If this is so, then the cost ought to be less than the amount stated, if proper methods of production are employed.

Four-Wheel Drive for Heavy Tractors

By W. F. Bradley

Special Representative of the Automobile on the French and English Front

Renault tractor near the front pulling a heavy field piece up a steep incline

PARIS, July 29—From the time guns were invented until the opening of the present war, the only known means of hauling artillery was by horse traction. In the various small wars prior to the present war use had been made of armored cars, carrying machine guns or very light artillery, but there does not appear to have been a single instance of the use of the internal combustion motor for the haulage of heavy artillery. So far as the French army is concerned, it was only on the eve of the war that the military authorities had finally decided on the adoption of the four-wheel-drive tractor for hauling big guns. Although the type was well developed when war broke out, it is certain that the number of tractors in existence was small, and the number of officers and men trained to the use of mechanically hauled artillery was very restricted.

It is not necessary to state in what proportions horses have been replaced by tractors in the present war. This much is certain, however; all the more difficult artillery work can be done by gasoline tractors better than it can be performed by horses, and there are no positions accessible to horse teams which cannot be reached by mechanical means.

Notwithstanding this, military experts are of the opinion that the horse will always be retained for certain classes of artillery work, notably for the haulage of the lighter guns. It must be remembered, too, that it is easier to convert material than to change officers and men. Long training makes it possible for men to get better results out of old-fashioned material than it would be possible for them to secure for a certain length of time with a more modern and efficient material.

There is no secret about the types of tractors used in the French army. They were all described in detail early in 1914—before the war clouds had begun to form—and they have only been changed in detail since then. To the four French makes, Panhard, Renault, Latil and Schneider have been added the Jeffery quad and some Holt caterpillars. It is not possible to make close comparisons between the Jeffery quad and the three leading French makes, Panhard, Renault and Latil. The Jeffery is a light tractor without a winch not primarily designed for war conditions, and only capable of being adapted to the haulage of light artillery over made roads or moderately easy country. There are many conditions such that the most powerful tractors can only reach commanding positions by hauling themselves up the hillside by means of the winch and then hauling their guns or trailers up in the same way. The Jeffery type has its own field of usefulness, but is not built for this class of work.

Jeffery Quad on a 30 per cent gradient

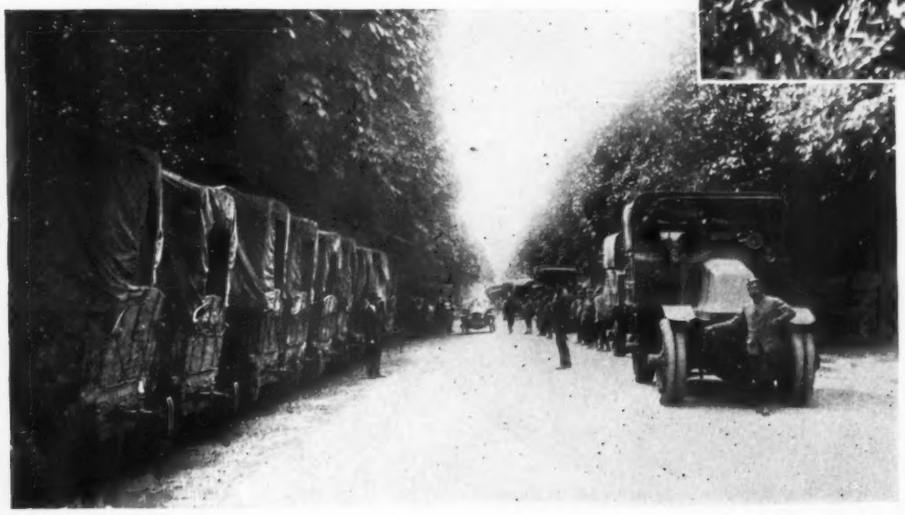
Expert opinion tends toward the belief that the final type will be the four-wheel-drive tractor similar to the Panhard, Latil and Renault. Owing to its lower pressure per unit of area the caterpillar can travel over soft ground inaccessible to the four-wheel

Conquering Heavy Roads in France

Above — Rough going at the front with heavy load and heavy road

Left—Jeffery Quad near firing line subduing inclines and mud

Right — Ammunition trailer being hauled up steep gradient by tractor

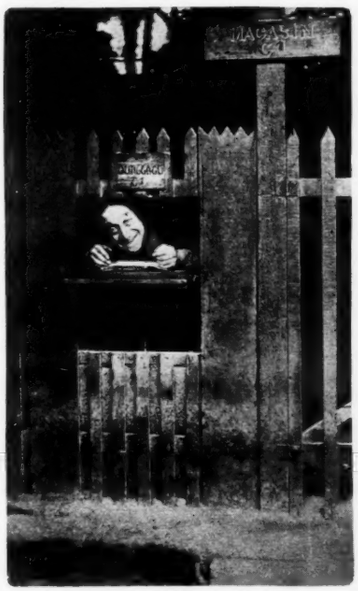


Below — Renault tractors and Troy trailers ready for severe service

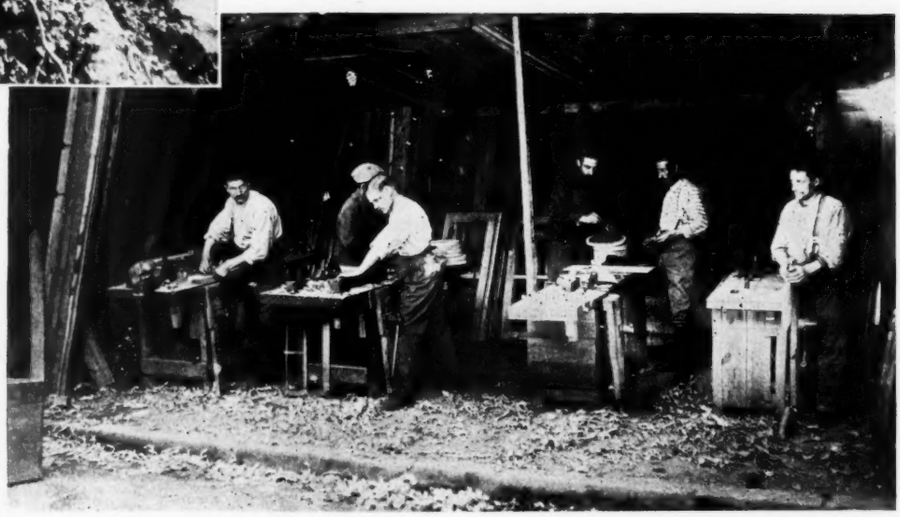
Workshops of a Portable Nature

Above — An Italian tractor used by the French artillery. Note wheels

Left—French artillery officer and Mr. Bradley on cross-country service

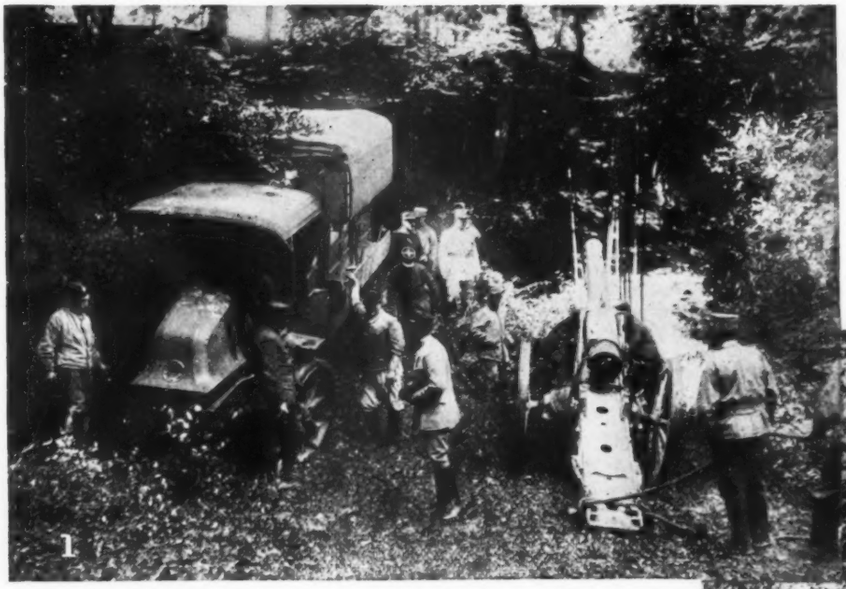


Right — Folies Bergeres artist now storekeeper at French tractor school



Lower—A wayside workshop, where emergency jobs are handled as they arise

French Artillery and Gasoline



1—*Renault putting a heavy field gun into position under difficulties*

2—*Hoisting the gun up an incline to put it in a suitable position*

3—*Latil tractor at the front crossing where no road exists*

4—*Renault tractor working along the firing line under difficulties*

driver, but this advantage is offset by its destructiveness of made-road surfaces, and officers who have had charge of both types for hauling artillery boast that with their four-wheel drivers they can do anything possible with a caterpillar.

Another type of tractor is represented by the Knox, Fiat and Isotta-Fraschini in Italy, and the Daimler-Forster in England. All these have been used in the war and important data exists regarding them. They are all, however, rear-wheel drivers, and as such incapable of doing some of the work possible with the four-wheel driver, or, as the French term them, total-adherence tractors.

All the four-wheel drivers mentioned above drive and steer at both ends. For a given wheelbase they have a turning radius considerably smaller than that of any rear-drive truck. There are, however, disadvantages in steering at both ends, for it sometimes happens that on very difficult hills the front wheels will get in one track and the rear wheels in another, making it a very difficult matter to move the vehicle. Such a condition only arises with the combination of a very steep hill, rough surface, and no width to turn. Because of this, one firm has produced a four-wheel-driver steering at the front only.

Training Tractor Crews

An interesting feature in connection with the four-wheel-drive tractor development is the training of crews to handle these vehicles. Quite independently of its truck and touring car schools, the French army has a special organization for the training of sub-officers and men in the driving and handling of tractors attached to heavy batteries. While it is comparatively easy to train men to handle ordinary trucks on made roads, and not exceptionally difficult to transform an intelligent soldier into a first-class chauffeur, it is a somewhat elaborate process to produce men capable of getting the best results out of tractors.

It is the conviction of the officers in charge of this school that a four-wheel-drive tractor can go anywhere, providing the surface is sufficiently resistant to carry the weight of the vehicle. But to pass through a forest, to climb over clumps of trees, to get up a 30 per cent gradient of natural earth, to slide a gun down a 60-deg. embankment and haul it out again calls for considerably more experience than the turning of a steering wheel and the moving of a couple of levers.

While many of the men received at the tractor school have had previous automobile experience, every profession and every grade of life is represented. A glance over the dockets of the men received for training revealed a comic artiste from the Folies Bergere music hall (incidentally he contributed to the gaiety of the army), an opera singer, a professional photographer, a working tailor, a solicitor, a footman, a taxicab driver, and a man of independent means. Naturally their ability is varied, but the material being of good quality and a spirit of emulation existing among the men, it is possible to make them all fit for artillery tractor service.

If the pupil has never previously driven an automobile, it is found that 15 days' instruction on an ordinary truck are sufficient to make him a passably good driver. After this he goes to the tractor section, and at the end of 3 weeks, on an average, is fit to be sent out to the armies in the field. In addition to his personal record card, each pupil entering the school is given a progress card divided into thirty-one numbered squares representing the days of the month. At the end of each day the number of points accorded by the instructor is recorded on the card, thus forming a permanent record of the progress made by the man during his stay in the school.

The driving instruction is of an intensely practical nature. In the neighborhood of the school is a large amount of very hilly forest land with a clay soil difficult to operate on after rain. The tractors distribute themselves in this forest, each vehicle having a dozen pupils aboard and being in command of a couple of sub-officers. The superior officers move about from group to group, supervising the general work and giving instructions as necessity arises.

When I was introduced to this school two Renault tractors were coming along a mud track by the side of a lake. Although weather conditions this day were fairly good, there was about 8 in. to 1 ft. of mud before solid earth was reached. A sharp right-hand turn brought the tractor into the forest, on a narrow, steep track just wide enough for one vehicle. The gradient being only about 10 per cent, the tractor worked its way along slowly, with a trailer in tow, without any difficulty.

After the 10 per cent gradient came a level portion, then a 32 per cent gradient for a distance of 150 yd., the track being rough earth with either high banks on each side, or thick forest growth. The trailer was unhitched and left at the bottom of this hill, the tractor advancing alone and paying out cable as it proceeded. The differential was locked, the sprag was dropped and two of the crew placed behind with big blocks of wood to scotch the wheels. On the most difficult portion a partially choked gasoline feed pipe caused a stoppage of the motor and necessitated quick work on the part of the men with the blocks of wood. When the full length of cable had been paid out the brakes were set, the wheels blocked and the winding drum put into engagement. Slowly the trailer was hauled up, the instructors meanwhile giving attention to the men who were handling the cable on the capstan and the winding drum, and also to the crew of the two men aboard the trailer. With only a few yards to go, and while on the steepest portion of the hill, the cable snapped. Quick work with the brakes prevented a mishap and the incident was taken advantage of to give a lesson in making knots.

The climb was accomplished with locked differential and chains on all four wheels. The previous day, after heavy rain, it had only been possible to climb this hill by the use of block and tackle attached to a stout tree, and when the first tractor reached the summit, it had to help haul up the second one.

Owing to the narrow width available, it is doubtful if horses could have got any load up this hill by direct haulage. In any case, animal traction would have been much longer and would have required a greater force of men than mechanical traction.

Rough Work in Training

After some work under easier conditions, but all over forest dirt roads, the crew was taken to a hollow resembling a huge shell hole. Here a Jeffery was found at work with a number of sub-officers who were being given a superior training to fit them for the handling of tractor crews. Here an officer gave a demonstration of how to take advantage of the nature of the ground. Sliding the tractor down the steep bank until it looked as if the tractor would stand on its nose, he attempted to come up the steepest portion of the bank. The first three attempts failed, the tractor attaining an inclination between 40 and 45 deg. and the motor then stalling. The causes of the failures were pointed out for the benefit of the pupils and other attempts made until after considerable difficulty the Jeffery reached the top of the bank. The private soldiers then went through the same tests with a Renault and a Latil tractor.

To get as near to actual war conditions as possible, a heavy gun was taken into a hollow assumed to be a suitable emplacement for firing on a distant enemy and the pupils instructed how to get it up a 60-deg. banking with soft surface and only just sufficient room to pass between the trees. This maneuver could only be accomplished with the use of a couple of tractors, both using their winches, and a considerable

Sometimes it is necessary to haul the vehicles over mere wagon trails

amount of block and tackle. It was explained to the men how to place the tractors and the tackle so as to use the available power to the best possible advantage. While some of the easier driving tests are being carried out, those members of the crew not required aboard are left at some convenient point and given a lesson in making knots, in splicing, and in fitting up block and tackle, for it is recognized that much of the value of a tractor lies in the ability of the men to use the machine intelligently.

Sub-officers, who will later command tractor teams, are given an entirely separate training. It is required that these men shall be really skilled drivers capable of taking a tractor over the wildest kinds of country, and capable of giving an example to the men of both skilled and daring driving. Great attention is also paid to their theoretical instruction, lectures being given them on the application of tractors to the haulage of artillery, and they are also made to spend a few weeks as apprentices in the factories manufacturing the army tractors. It is thus certain that they will possess a complete mechanical knowledge of the vehicles which will later be placed in their charge.

When an artillery battery is motorized it becomes entirely dependent on gasoline for its ammunition and other supplies. Thus during the period of training it is not necessary to haul a gun on every occasion; cases of sand can represent shells, food, gasoline, chains and other equipment which, under actual war conditions, must be taken to the gun with unfailing regularity.

Conferring Life Through Care of Finish

By M. C. Hillick

MORE care of the finish and longer life for the car is a shibboleth that may well be observed in an attempt to keep it from going prematurely to the scrap heap. This is the day of the metal car body, principally sheet steel, and it requires no chemist to tell us that rust and corrosion, once developed upon the surface, gnaw remorselessly at it until the metal collapses and buckles under the strain. To prevent this result is the chief concern of the car owner and the car maker, for in the last analysis the manufacturer profits best by making his products to wear to the utmost.

Grant that the brand new car comes from the manufacturer well painted and finished, and in other respects is a credit to his skill and reliability. It is bought by some one who takes pride in keeping the car in fine condition, and he starts out with that purpose in view. Lack of information of a practical nature leads him to neglect some of the vital points in care taking, with the result that rust starts at some of the exposed parts of the surface. The methods of prevention are simple but indispensable. The cure, if any, is correspondingly difficult. First, constant attention to the needs of the surface. The sheet steel, even when buried under the weight of much paint and varnish, requires constant watching, for here a little and there a little, the waspish sting of the rust nips at the metal, finds a niche to cling to and keeps on nibbling.

To begin, scrape the rust clean from the surface, using for the work a hook scraper and some emery paper, cleaning off all the corrosion and preparing a foot-hold for the rust-inhibitive metal primer. Touch the afflicted part with this material, and let it dry thoroughly. In due time fill the cleaned-out spot with enough hard drying putty to make the depression level with the surrounding surface. When this putty, applied smooth to lessen the labor of sandpapering, is dry, bring it down smooth and fine with sandpaper, and then coat with some of the body color, making the first coat to dry "dead"—that is, without gloss of any sort. Apply a second coat into which is stirred enough varnish to develop the necessary luster. Then when this coat has dried cuff the gloss off to match that of the finish, using for the work a piece of plush moistened in water and flicked across a bit of pumice stone flour to increase its erosive effect.

The above class of work may be performed by the car owner or the chauffeur, none of the details being too technical for the lay mind to master, nor the processes too intricate to accomplish. By keeping a close check upon the appearance and wear of the car, and taking any outbreak of the surface at its initial stage, the wear of the surface may be greatly prolonged, with the best feature of the finish consistently maintained throughout the life of the vehicle.

Rust May Develop

Perhaps the question may be raised as to the tendency of the cars with the oven baked finish to show rust development, etc. At the edge of panels, about the moldings, and where laps occur, there one needs to look sharply for corrosive manifestations, for here dampness finds a foot-hold and rust appears. Therefore, in addition to the prevention here indicated, take advantage of other precautionary measures, chief among which are the following: Light, ventilation, washing and renovation, and storage quarters.

The newly varnished car may safely be washed with clean, cool water which will serve to harden the varnish and increase its brilliancy, and keep it from spotting when used over muddy or dusty highways. When it is deemed desirable to use a feeder for the varnish—in a word, to renew its diminishing powers for service—then resort may be had to some of the reliable renovators and polishes now available. Use these mediums with judgment, and as often as the requirements of the service suggest, bearing in mind, meanwhile, that no renovator or polish is qualified to take the place or do the work for which the varnish of efficient and capable composition is designed.

Secret of Aluminum Piston Success

Errors in Design More Serious with Alloy than with Iron—Service Depends on Correct Proportions and Correct Alloy—Modified Theory of Side Pressure Distribution

By A. Ludlow Clayden

THE aluminum alloy piston has just completed its first year of usage as a stock part of an automobile. Thousands have been made both by the sand-cast and the permanent mold processes; tons of aluminum are to-day reciprocating within the cylinders of American automobiles. That the aluminum piston has been an absolutely unqualified success is only true in the cases where all the conditions have been correct. There have been troubles due to many different causes, but these troubles have been of a character which has allowed engineers to perceive the reason and to avoid it in future. Some manufacturers have had no trouble, others have had a good deal, but the average experience has been quite satisfactory. Considering how new a thing it was a year ago, the aluminum alloy piston has established itself with much less difficulty than most novelties, the set-backs have been comparatively few and their causes readily traceable.

Importance of Right Alloy

Among the many alloys used for casting pistons there are all sorts of mixtures of metals. Most alloys are kept a secret by the foundry firm which owns them, and most firms have now discovered the best alloy for piston purposes. It is a metallurgical question, complicated by the desire to cast as thin as possible so as to avoid wasting the precious metal in machining, and it is not yet possible to say that just such and such a mixture is the best for all purposes. It would be absurd to deny that wrong alloys have been used in the past year in some cases. A good many pistons did get out with too soft a metal, and these pistons have worn rapidly, too rapidly to make them commercially satisfactory. The bulk, however, have been of better material, harder and much more durable, and it is safe to say that hardly a casting firm in the business but knows more about the proper alloy and the proper method of casting than it did a year ago.

It is particularly noteworthy that the troubles due to wrong alloy have been almost all shown up by rapid wear and not by failure. Absolute fracture has been an uncommon fault. This means that engineers and aluminum experts do know the proper proportions for strength, that they knew them a year ago in fact; what remains to be settled finally is the best metal for surface durability and not the best metal for strength. If we can get the surface hardness the strength will be satisfactory with normal design for the parts exposed to stress.

Engineers are perhaps a little apt to forget that an automobile piston has two functions to perform. It has to transmit the driving force of the expansion and it has also to act as a crosshead. In a steam engine the piston is purely a piston, the crosshead which takes the side thrust of the connecting-rod is a separate part, better suited for its work than the piston itself. Light weight and limitations of possible height, together with the desire for simplicity, make a crosshead for an automobile engine altogether out of the question; it would be an absurdity, but having thus discarded the crosshead it must not be forgotten that the functions of this part have merely been transferred to the piston and the latter must therefore be designed once as a piston and once as a connecting-rod guide.

Gas engines of the stationary type have always had long, heavy pistons with a very large surface in proportion to the expansion thrust on their heads, so large a surface that the unit side pressure due to connecting-rod angularity is very small and durability correspondingly great. The early automobiles followed the gas engine and their pistons were designed in accordance with gas engine rules, but it was soon discovered that the length and weight of the piston could be cut down without trouble; the factor of safety of the gas engine was unneccessarily high for an automobile motor. Simultaneously a desire to reduce the bulk of the whole engine led to a general shortening of connecting rods, thus increasing the side pressure due to the angularity, and at the time of the introduction of the aluminum piston we had practically reached the limit of small piston surface and great connecting-rod angularity possible for iron pistons.

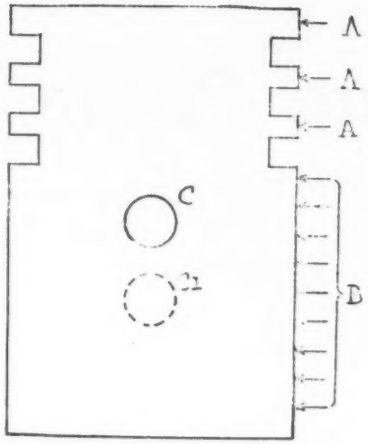
This being the case it was manifestly impossible simply to substitute a softer metal for the already very highly stressed iron; such a procedure was to court failure, yet many engineers took a chance at it. Those who did so and had no trouble really proved that their iron piston was larger surfaced than it need have been. The absolutely correct proportion for iron cannot be also the correct proportion for aluminum alloy.

Equalizing Side Pressure

In the design of pistons it has been a rule in gas engine practice to take moments about the piston pin, and to arrange the pin so that it is at the center of balance; *not* the center of the piston. The rings are neglected and the piston is regarded as touching the cylinder on the lands between the rings and over the skirt. A calculation on this basis will then enable us to locate the piston pin so that the unit side pressure between piston and cylinder wall, due to connecting-rod angularity, is the same at every point of contact. Neglecting the spaces occupied by the rings this will make the correct position for the piston pin a little below the center of the piston length. This is partly offset by the effect of friction which causes the proper position to be above the center, so, following gas engine practice, the pin position commonly is very little removed from the middle of the piston length, with the short automobile type of piston.

Now this assumes that the piston touches the cylinder on the lands between rings, and there is very grave doubt if this is ever the case in automobile practice. Firstly, the expansion of the head has to be allowed for to an extent which makes it impossible for the first land above the top ring ever to touch the wall. The case of the second and third lands is little better, in fact the clearances recommended for modern high speed engines are such as to prevent these narrow bands of metal from coming in contact with the cylinder. Thus, instead of neglecting only the spaces occupied by the rings, we have to neglect the whole

part of the piston which carries the rings. If there are three rings ¼ in. wide and ¼ in. apart, and the top ring is ¼ in. below the top of the piston head, there will be six ¼ in. which do not touch instead of three ¼ in. allowed for by the old formula. This means that when we begin to figure the piston as a crosshead we should imagine it cut off at the bottom of the lowest ring groove. Then we are left with the skirt, then add on top of it such rings and ring grooves as pin comes out at just a trifle above the middle of the skirt. In other words, we design a crosshead consisting of piston skirt, then add on top of it such rings and ring grooves as we think are necessary.



This shows the two ways of figuring the piston pin position. Including the arrows A (that is including the patches between the rings) the pin position to give equal unit pressure is the upper position shown. Neglecting all the ring-carrying part of the piston the position of the pin works out as shown in the lower place. Of course this is just a diagram and not in strict proportion

It is instantly obvious that the effect of this method of treatment is to increase the distance between the piston pin center and the top of the piston, which means that the height of the whole engine is increased a little unless we allow the bottom of the skirt to come well out of the cylinder at the bottom of the stroke. There is no harm in doing this, as the piston has little guiding to do when nearing the bottom.

If this new way of attacking the problem is the correct one, and there seems every reason to think that it is, then we must abandon the idea that the length of a piston should bear any definite proportion to its total length. Rather it may be suggested that the part of the piston below the rings should bear a proportion to the bore. For example, it is possible that a length of skirt or contact portion of piston should be provided equal to the bore. Possibly a little less than this is sufficient, but in a general way it is probable that length-bore is about right. With ¼-in. rings this means that the total length should be equal to the bore plus about 1½ in. for the ring carrying portion. Another possibility is that we may be able to place the rings closer together, having given up all idea that the lands between the rings have any function as a guide. For example, with ¼-in. rings it may be enough to allow 1/16 in. between each ring and ⅛ in. at the top. This adds up to 1 3/16 in. as against 1½ in. Experiments along this line are expected, so it may be found that it is possible to get sufficient guiding surface without a piston of *much* greater length overall than the present practice.

Effect of Expansion

Another matter that is affected by the precise alloy used is the clearance required. Some alloys have a much greater rate of expansion than others, and this means they require a correspondingly greater clearance. Luckily it appears to be the harder and better wearing alloys that have the smallest rate of expansion. Here again the dual function of the automobile is the thing which is causing the trouble. If the lower part of the piston which is really only a crosshead could be kept at a constant temperature it could be made a close fit in the cylinder and there would be no slap. Thus attempts have been made to so separate the head part carrying the rings, and the skirt part acting as the crosshead in such a way as to prevent the conduction of much heat from the head to the skirt. The earliest example of this sort of construction is, of course, the Zephyr steel piston which had a head and a skirt connected by a small diameter column in the middle.

Summing up the present situation regarding the aluminum alloy piston it may be said that every one wants to use it, but we are not yet able to state exactly how it should be designed to give long wearing qualities. In a year of use the question of the right alloy has been fairly well settled, and there are several alloys which are entirely satisfactory. We now want to find some means for reducing the unit side pressure, and some means whereby the clearance can be reduced a little more. Possibly the long piston is the answer, possibly some special form may arise that will be still better, but present appearances are strongly in favor of the long piston as the most probable answer.

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A Chance for Invention

ONE conspicuous blemish on nearly every seven passenger car is the two slots in the tonneau carpet which occur where the support of the folding seats goes through into the floor. However neatly the seats themselves may stow away into the back of the front seats, and many do now disappear completely, their presence remains obvious as long as the carpet has to be cut. In fact, the slits in the carpet are made all the more prominent by reason of the complete disappearance of the seat itself.

If the "leg" of the seat came away from the floor altogether and stood in a socket, this would not be such a disfigurement to a fine car as the present carpet slits.

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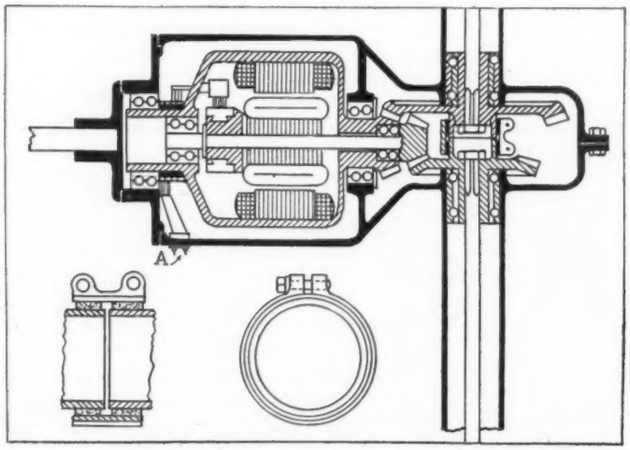
A Novel Drive for Electric Car Axles

A NOVEL rear axle drive for either electric cars or gasoline-electric has been invented by L. J. Monahan, mechanical engineer, Oshkosh, Wis. The apparatus comprises an electric motor mounted on the rear axle, the armature connecting one axle section by bevel gear and the reversely revolving field element connecting the other axle section so that the combination forms virtually an electrical differential.

A feature of importance is the frictional device which is located between the axle sections. This is shown in Figs. 2 and 3 and is for the purpose of preventing too easy a differential action which would take place with this free operating drive. The frictional bands allow slippage for corner turning but place a burden upon one wheel which prevents it from slipping too easily, thus providing internal differential friction.

The current is fed to the motor through the collector rings *A* and reversing action is given by a reverse current switch.



Section through axle with electric motor differential

Kissel All-Year Town—Victoria Body

Sedan and Coupe Types Continued and Now Mounted on the Smaller Six—Elm, Ash and Steel in Bodies and Tops

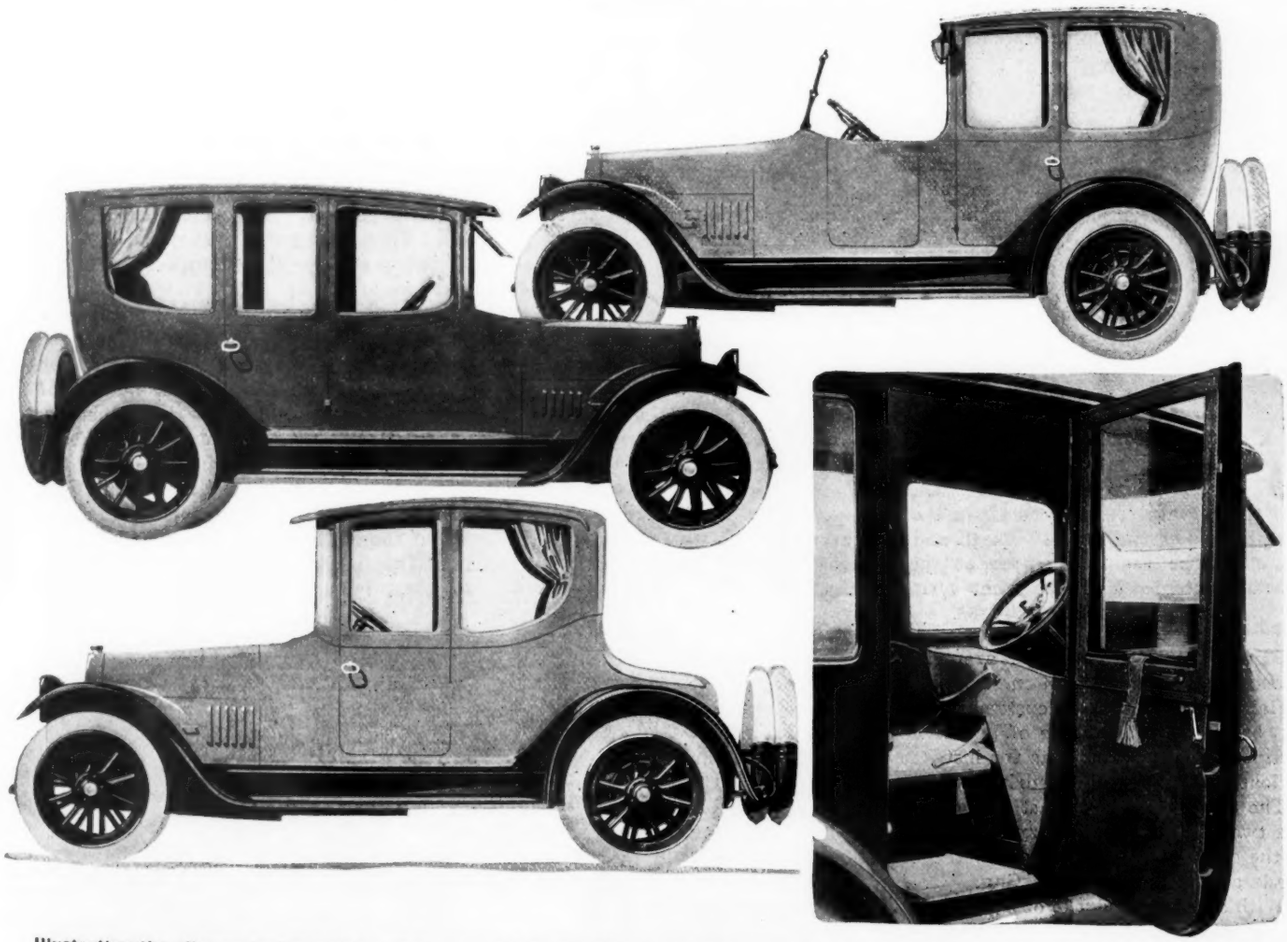
FOR the winter of 1916-1917 the Kissel company has brought out a number of its improved All-Year bodies for the chassis model marketed under the title of Hundred Point-Six. This is the smaller of the two Kissel sixes and the larger one will also be equipped with the All-Year tops as before.

The new top line includes the sedan and coupé designs which were marketed last year and in addition a town car top mounted on a victoria body. The price of the sedan and coupé bodies is $1,520, while the victoria town car lists at $1,850. These bodies are about the same in construction as those of last year. They are featured by their easy convertibility from the open to the closed type, thus allowing the owner to have all the benefits of two cars for practically the price of one.

Selected white ash and elm is used for the main and door frames of the detachable top with a covering of sheet steel. The roof is three-ply paneled white wood under heavy duck canvas laminations. French plate glass is used for the windows, and these are set solidly into hard rubber to prevent leaks and to eliminate rattles. The standard tops are leather lined and special cloth lining can be secured at additional cost.

The body and the top are connected at ten points by means of rectangular bolts fitted into sockets which are arranged to prevent any projections from marring the appearance. Between the body and the top there is inserted a layer of felt anti-squeak material. In attaching the top the electric wiring is connected automatically by spring plungers. The winter bodies are all equipped with dome lights operated by push buttons.

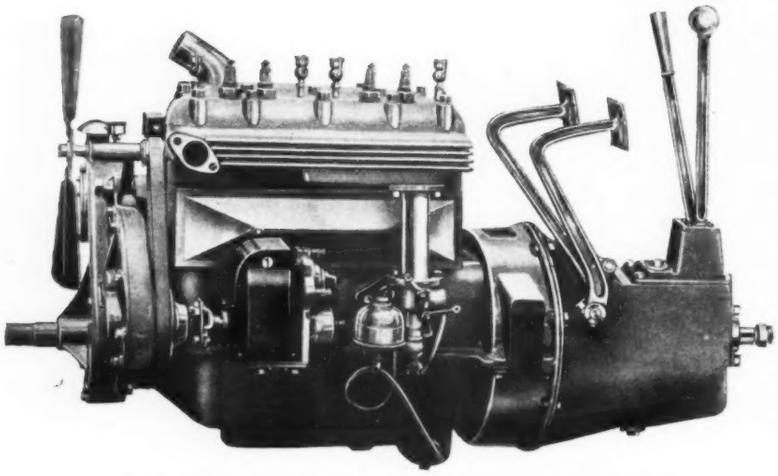
All the Kissel bodies are fitted with divided front seats, a wide corridor being provided, allowing for easy passage. Seventeen coats of paint are used, requiring twenty-two finishing operations. The hinges are pressed steel and are concealed. Ventilation is secured by dropping the windows into the lower halves of the doors.



Illustrating the all-year bodies which will be mounted by the Kissel company on the small six known as the Hundred Point model. This is the same line of bodies as was marketed last year with the addition of the Town-Victoria body shown in the upper right. The center body is a sedan-touring and the lower a coupe-roadster. All of these are convertible types, changing the car from a summer to a winter job in a short time

Rainier Delivery Car Ready Soon

Passenger Car Maker Enters Truck Field With 1000-lb. Wagon to Sell for $850. Chassis Assembled from Standard Units



Unit power plant used on the Rainier 1000-lb. delivery wagon

JOHN T. RAINIER, who used to make passenger cars is now associated with P. N. Lineberger, in the manufacture of a 1000 lb. delivery wagon to sell for $850. Production will start in October on this car car which is to be known as the Rainier. This is the first time this name has been linked with a motor vehicle since the absorption of the Rainier interests by the General Motors.

While of conventional design in the main, there are points in general appearance which are distinctive. The radiator, is a reproduction of the Rolls-Royce form. It is high, as is the square, blocky hood, which gives a good head of water above the motor for the thermo-syphon cooling system. The hood is of the three-part type with top and sides separate, snap fasteners being located at the eaves, such as found in big trucks.

The frame has been carried very low and all of the way back to the tailboard, to eliminate any body overhang. The cab floor hugs the frame closely and with the foot-board and dash is a single steel stamping. Fenders are wide and follow the curvature of the wheels in the approved style. Running-boards extend the full length and are covered with aluminum. The tubular bumper at the front is secured to brackets integral with the front spring horns.

Load Space 74 in.

Tires are 33 by 4-in. all around, and mounted on demountable rims. The 115-in. wheelbase permits of the use of larger bodies than is customary on ½-ton cars and this has been taken advantage of by the design of a number of distinctive body features as for instance, the length of 74 in. of load space back of the driver's seat.

The engine is a block-cast unit of the high-speed type. It has two bearings and is very compact due to integral casting of the cylinders, crankcase and both manifolds. The cylinder heads are in a separate casting.

With a bore and stroke of 3¼ by 4½ in., it rates 16.92 hp. by formula but at 2000 r.p.m. it develops according to the makers, 28 hp. The crankshaft bearings are 2¼ and 2½ in. long, respectively, and the connecting-rods are drop-forged I-beams 9½ in. between centers with 2-in. crank-pin bearings. Mild steel against cast iron teeth helically cut serve to quiet the timing gears, their face width being ⅞ in.

Valves are to the left, their mechanisms covered by a single pressed-steel plate. They are 1⅜ in. diameter.

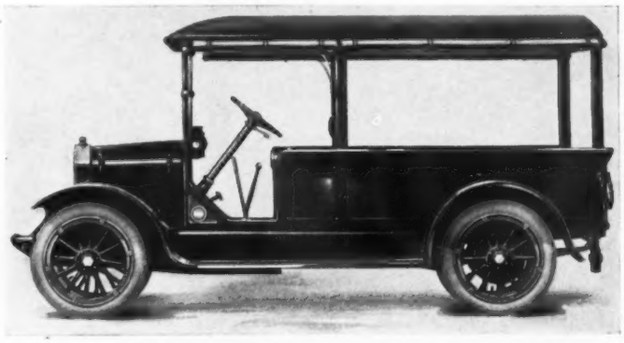
The Carter multiple-jet carbureter of 1⅛ in. size, bolts to the inlet pipe on the left side, just behind the Dixie magneto and has an air control on the dash. The magneto is driven from the timing gear-case by a leather coupling from the fan-belt pulley. It is fitted with a dash spark control.

Splash Lubrication

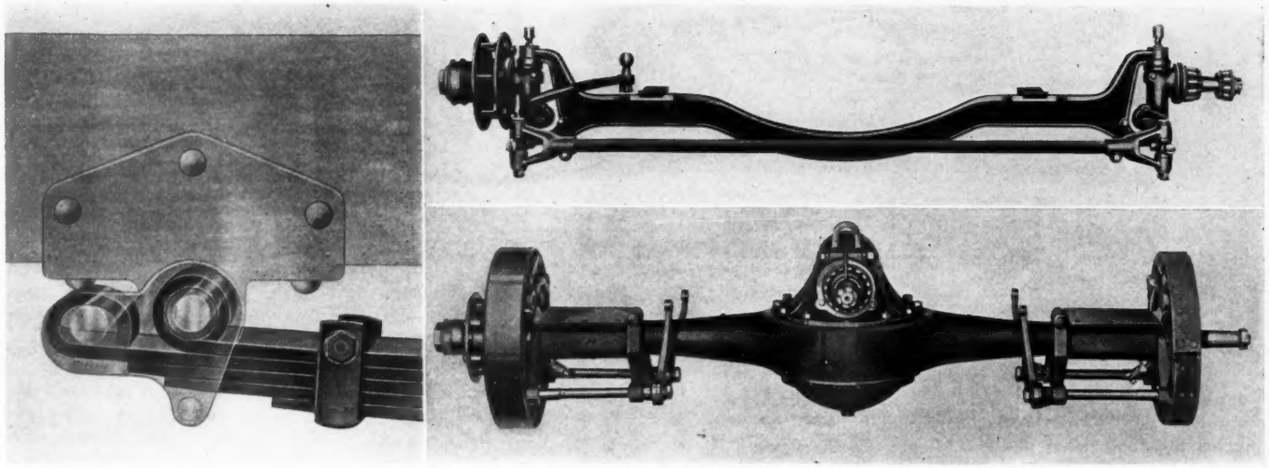
Circulating-splash lubrication is employed, the oil being strained and pumped from the reservoir by a plunger pump eccentric-driven from the camshaft. This delivers the oil to troughs beneath the cranks. Overflow is fed by a pipe to a groove cut in the inner face of the camshaft gear, communicating with the gear teeth by holes drilled between them. Pockets also collect the splashed oil and direct it to the main and camshaft bearings. Excess oil splashed on the cylinders is prevented from causing smoking by holes drilled in each piston below the scraper ring. There is an oil gage on the dash and a level indicator at the side of the crankcase.

A Borg & Beck three-plate dry clutch drives the Grant-Less three-speed selective gearset. This clutch is adjusted by shifting two bolts. The gears are of nickel steel.

Final drive is through a shaft with two universals to the Timken pressed-steel worm-driven axle, Hotchkiss drive eliminating all radius rods or torque arms. The spring construction consists of a double-eye arrangement at the fixed front ends of the rear springs. The top leaf is provided with the usual bronze-bushed eye. The second leaf, instead of ending just below this eye extends beyond it and is bent to form a secondary elliptical eye which normally floats about an auxiliary pin. The third leaf extends out as far as the first leaf, so that 50 per cent more strength is said to be provided at this, the weakest part of a spring. In the event of the breakage of the top leaf, which ordinarily would make the operation of the truck impossible, the second pin and eye come into play, being otherwise out of action.



Typical body standard on the Rainier 1000-lb. commercial vehicle chassis



Some of the Standard units used in the assembled Rainier chassis which will be ready for delivery in October, according to the present plans of the manufacturers

Safety at this point is still further provided for by a side plate and a pin below the bracket. The rear springs are 50 in. long, extending back nearly to the end of the frame, and 2¼ in. wide. They have eight leaves. The front springs are 38 in. long, 2 in. wide and have seven leaves.

The frame is of unusual size, being 4½ in. deep, of 5/32-in. gage pressed steel, and properly necked in at the front to provide a short turning radius. This is a clear inch deeper than on some trucks of the same rated capacity.

The front axle is of Timken make, I-beam type, of 2½-in. section, having nickel steel steering knuckles. The steering gear is at the left, of Gemmer make, with an 18-in. hand wheel. The throttle lever is below the wheel, of the same type as applied to Renault cars. The throttle is principally controlled by a foot throttle. The levers are in the center of the cab.

Standard equipment consists of one extra rim, three oil lamps, the front lamps being attached to the rear of the dash, with their lenses flush, a Long horn, a tire pump, jack and full set of tools. Electric lighting and starting will be applied for $85 additional.

Several standard bodies are offered, modeled upon the designs used by leading New York department stores. The open express type, 74 in. long and 44 in. wide, known as Model E sells for $100.

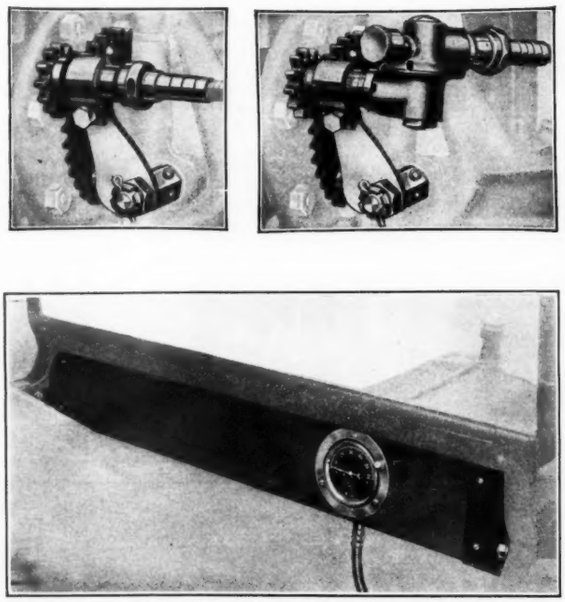
Standard painting is in contrasting colors, special painting being charged for extra. Regularly, Model E, the express body type has a green body with red crest panels, red wheels and black chassis, selling for $100, so painted. Model S, panel type, has middle and lower panels of blue, upper panels of black, red wheels and a black chassis, selling for $110.

New Ford Speedometer Easily Attached

THE Standard Thermometer Co. of Boston, Mass., has just brought out a new Ford speedometer combination consisting of an instrument board to fit in the cowl, flush mounted speedometer and flexible shaft mechanism.

The instrument board is covered with imitation leather and is cut out for the installation of the speedometer. It may be installed on the Ford car by removing one nut on each side of the dash cowl, slipping the metal and pieces of the instrument board over the bolts, and then replacing the nuts.

The installation of instrument board and speedometer can be made by any Ford owner without drilling any holes. The driving sprocket for the Standard speedometer is bored to fit the hub flange of the Ford car; the instrument board fits the Ford cowl and the speedometer head fits the instrument board.



Flexible shaft connections on wheels and new instrument board sold with Standard Ford speedometer

Two outfits of this type are at present being furnished for the Ford cars: Outfit No. F-330 consists of instrument board, flush type speedometer, 66-in. flexible shaft and case, and the Standard Thermometer Co.'s regular Ford drive with the new support which permits installation on any Ford car whether or not the steering arm may be drilled for speedometer installation. This outfit lists at $14.

Outfit No. F-355 is similar to the above with the exception that the drive is the Standard Thermometer Co.'s patented swivel type, which is particularly advisable for use on cars equipped with shock absorbers, as it removes the driving shaft from every possibility of collision with and damage by the shock absorber case. This outfit lists at $15.

The Rostrum

Speedometers Should Be Easy to Read

EDITOR THE AUTOMOBILE:—On page 179 of THE AUTOMOBILE for Aug. 3 appeared an item entitled Efficiency vs. Neatness.

There are 5280 ft. in 1 mile. If a car is moving at 60 m.p.h. it advances 5280 ft. in 1 min., or 88 ft. per sec. Roughly speaking, one and one-half times the mile speed per hour is the foot speed per second.

It is not when going slowly that the driver is most apt to be interested, but when speeding. Even at 20 to 30 m.p.h., he is moving at 30 to 45 ft. per sec.; if at 40 to 50 m.p.h., at 60 to 75 ft. per sec. What driver at such times dares take his eyes off the roadbed for ½ or even ¼ sec. to study the figures? If he desires to know the time of day, a quick glance at the clock is sufficient—the position of the hands tells him; the figures on the dial are of no consequence. It should be so with the speedometer.

There are speedometers made with black dials and white hands, but the designers could not resist the temptation to make them pretty; so they are delicate scroll work. Drop the pretty, and consider only utility—make the hands solid, straight bars, ⅛ in. wide, and charge them with phosphorus so that they will shine at night. With such an indicator, a furtive glance is all that the driver will ever need.

It would cost no more to have speedometers so built as to be easily read, if the manufacturers of automobiles would insist upon it when placing their orders.

This brings up another point. Every indicator on the dash should, regardless of appearance, squarely face the driver's line of vision.

Utility First is the elder of its twin brother, Safety First.

Boston, Mass. W. G. R.

Retiming a 1905 Mercedes Car

Editor THE AUTOMOBILE:—I have a 1905 Mercedes which originally had a make-and-break ignition, which I changed to a high-tension. I would like to know what is the correct valve timing for maximum speed.

2.—What is the correct valve timing for ordinary running?

3.—Correct timing for the magneto in each case?

W. L. W.

Port Chester, N. Y.

—The changing of the ignition system from low-tension to high-tension should not affect the valve timing. In regard to ignition timing, it may make a difference. THE AUTOMOBILE has no record of how the 1905 Mercedes was timed when it left the factory, and if there are no marks on the flywheel or other parts of the engine gear showing how the engine was timed, it will have to be done experimentally. In doing this, it is well to work with the opening of the intake and the closing of the exhaust, allowing the closing of the intake and the opening of the exhaust to fall where it will with the shape of the cam contour.

First try letting the intake valve open at as near 10 deg. after upper dead center as possible. The exact number of degrees will depend on the timing gear and you will have to take the nearest tooth mesh to 10 deg. making what difference there is on the low rather than on the high side of 10. Then set the exhaust camshaft so that it will close the exhaust valve at about 5 deg. after upper dead center. With this as a starting point you can work the engine back and fourth a tooth at a time on both the intake and exhaust valves. It may be that the timing stated will be perfectly satisfactory.

2—The timing given under question 1 will be correct for ordinary running and up to as high speeds as you will be able to secure from this car. In general the rule for timing motors for racing is to push everything ahead. That is, both intake and exhaust valve openings and closings as well as the spark timing.

3—For ordinary running the magneto should be so placed that on full retard the spark occurs exactly at upper dead center. For racing the magneto is generally advanced one or two teeth.

Found Click in New Engine

Editor THE AUTOMOBILE:—What would be the most likely reason for a click in the engine of a 1916 six? This click

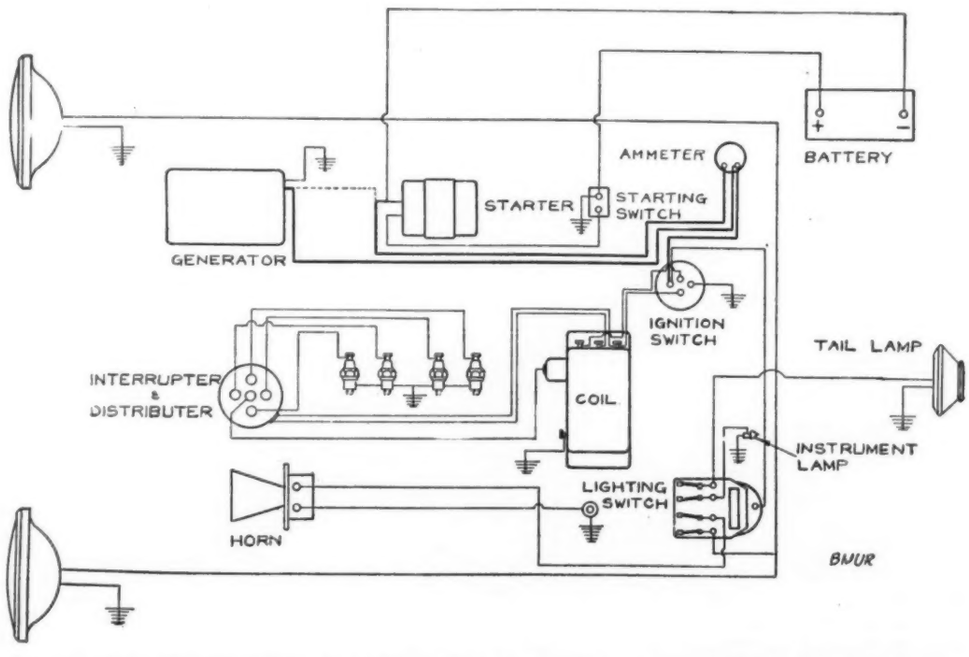


Fig. 1—Wiring diagram showing the installation of an ammeter on Hupmobile with the Bijur system

sounded like a valve tappet. The car was returned to the factory but they were unable to locate it so put in a new motor. Could it be that the camshaft was a little out of true?

2—Has the Buick company announced its 1917 sixes yet?

3—What is the bore and stroke of the Grant six, the Buick little six and the new Overland little six which was just announced?

4—Kindly give the names and prices of all three-passenger roadsters under $1,000 and state whether or not they are the clover-leaf type.

Waltham, Mass. C. H. B.

—It is quite difficult to state with any likelihood of hitting the truth which of the many moving parts of a motor would be most likely to make this clicking sound. An undercut cam, a valve stem which is too short, a loose piston, misaligned crankshaft bearings or faulty rod bearings are all possible causes.

2—So far, for the coming season the Buick company has announced the continuation of its present small six and in addition a four-cylinder car.

3—The bore and stroke of the Grant six for 1916 is 3 by 4¼. The Buick little six is 3¼ by 4½ and the Overland model 85 six is 3¼ by 4½.

4—For a complete list of body types and prices you are referred to THE AUTOMOBILE for Dec. 30, 1915, in which the price list of these cars was given. No lists have as yet been made up of 1917 cars as these are being announced by the manufacturers every day.

Needle Valve Probably Misadjusted

Editor THE AUTOMOBILE:—I have a 1915 model 37 Oakland touring car equipped with Maxwell carbureter. This spring I had the engine overhauled, put in new pistons, scraped out the carbon and ground the valves. The air valve broke off its hinge just before I put the car up for the winter, so this spring I sent that to the factory to have it overhauled and put same on after overhauling.

Now the engine runs smoothly at anything less than full opening of throttle and pulls well also, but when the throttle is opened first it pulls all right, too, but on a long pull holding it open all the way it will die down suddenly and commence to backfire through the carbureter. On a long pull in second it will do the same thing. This seems to be at speeds in excess of 25 m.p.h. in high and in excess of 18 m.p.h. in second. When it starts to spit like that and I release the throttle it will run smoothly, but, of course, the car will slow until I have to throw it in low, as it does not get the gas to push it. Have tried closing off air almost completely, also opening very wide, but am still puzzled. Can you help me?

A. T. McG.

Liberty, N. Y.

—Most probably your trouble is incorrect adjustment of the needle valve which controls the size of the nozzle. If this is wrong it cannot be compensated for by air valve adjustment. The gasoline nozzle setting is controlled by the thumb screw at the bottom of the carbureter directly under the flange where it attaches to the manifold. Try slacking this back a quarter turn at a time. The symptoms you describe are also occasionally caused by faulty spark plugs.

Putting Ammeter on 1916 Hupmobile

Editor THE AUTOMOBILE:—Kindly advise me how to install an ammeter on a 1916 Hupmobile roadster. If possible, I would like wiring diagram showing where to put the ammeter in.

Keene, N. H. G. P.

—The method of installing an ammeter on the 1916 series N Hupmobile will vary according to whether the electrical equipment is Westinghouse or Bijur. The accompanying illustrations, Figs. 1 and 2 show the installation for both these systems.

Changing National to Racing Car

Editor THE AUTOMOBILE:—I have a 1914 improved series V model National. It is now a seven-passenger and I would like to make a racer out of this car. Would like you to give me an illustration or two and some advice through your columns. I do not want to use the bucket seats but cut down the regular front seat and use it so that there will be some comfort to it.

Cutting the seat down, building the cowl and rear end is the parts I want advice on, also on lowering the steering gear.

I am in a position to do this work myself, also the metal work, cowl and stern. Where could I obtain fenders that could be fitted. I am counting on cutting the running-boards about half in two.

Helena, Ark. W. N. B.

—In building the cowl and tail, the point which must be had in mind is that the car presents no surfaces which would increase the wind resistance. Therefore, the cowl should be a continuation of the line of the hood, whether this line is curved or as it should be preferably, straight. The tail does not make such a material difference unless you are traveling at speeds above 80 m.p.h. Probably one of the best worked out streamline racing bodies in this country is that used on the Packard aeroplane racer shown in THE AUTOMOBILE for May 4, 1916.

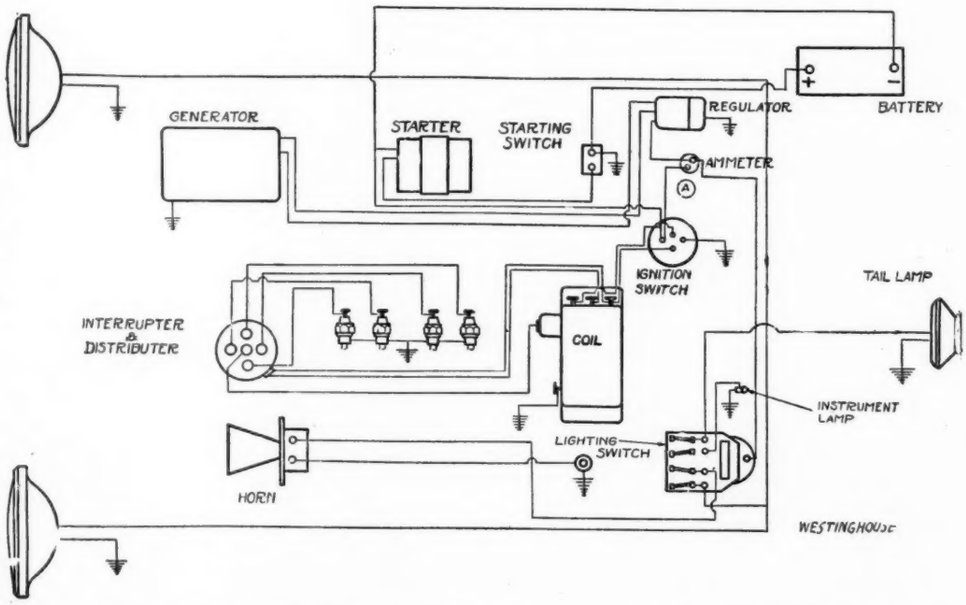


Fig. 2—Wiring diagram showing the installation of an ammeter on a Hupmobile with the Westinghouse system

The FORVM

ECONOMY OF THE SEMI-FLOATING AXLE DUE TO PRINCIPLES—MEETING THE DIFFICULTIES WHICH ARE TO BE FOUND IN THE TWO-CYCLE ENGINE

Semi-Floating Spells Economy

By A. M. Laycock

DURING the last few years the semi-floating axle has become very popular, not only in the passenger car field but in motor truck service as well, even up to 5 tons capacity.

However, there are still people who have very decided views as to the relative merits of the semi, three-quarter and full-floating rear axle. Perhaps it has never occurred to most readers that *the tonnage* of the world is carried on semi-floating axles.

All railway rolling stock, including locomotive, freight car and passenger coaches are operating on semi-floating axles. If we should subsitute the term—"fixed hub"—for semi-floating, as one of the axle manufacturers has lately announced, it might be better understood applied to railroad work, as all heavy rolling stock has the wheels keyed or fixed to the axle. In all railroad designs, the dead weight of the vehicle is carried on the axle itself, and the torsion as well; while every one can realize at a glance that the dead weight is carried on the axle, it is not so easy to grasp that there is a considerable torsion also.

On large European railroad engines, using inside and outside cylinders, it is quite easy to realize that torsion is present in the driving axle, and even with the conventional engine, using two outside cylinders; but with the passenger and freight cars, it is difficult to appreciate that considerable twisting takes place on the axle, but on rounding sharp curves when the outer wheel is running on a larger radius than the inner, the twisting moment in the axle is equal to the total weight carried multiplied by the radius of the wheel and the coefficient of friction on the rails which, when figured, amounts to a considerable torsional stress in the axle—in fact, absolutely in the same proportion to the twisting moment in the semi-floating 5-ton worm drive axle, as this is figured in the same way, particularly when propeller shaft brakes are used.

Advantage in Widely Spaced Bearings

Taking for granted that we have the combined bending and torsion in the axle with a fixed hub, the outstanding feature in favor of this construction for real heavy duty, lies in the fact that bearings are spread so very far apart—in fact, on most passenger and freight cars the bearings are on the outside of the wheel, and in European locomotive practice, with inside cranks, the bearings are always on the outside, while on the tender of the engine they are generally spread as far apart as possible. This, of course, greatly enhances the life of the bearings, as the unit pressures are so much lower, particularly when rounding curves when bearing pressures are maximum. It would be interesting to note what would happen to a full-floating axle taking curves regularly at 35 m.p.h. under these extremely heavy loads. We prophesy that the train officials would have an anxious time between hot boxes and time schedules.

Contrasting this heavy design with the full-floating type, where the bearings are spaced 4 in. to 6 in. apart as against 64 in. in freight car service, considering that the wheels are approximately 33 in. diameter, as against 36 in. to 40 in. on the motor truck and that the freight car is operating on a perfectly smooth road bed, whereas the automobile is subjected to direct violent blows on the tires due to rough roads but suffers very much more from the side blows delivered at the rim of the wheel when swaying back and forth in deep ruts over country roads, and always having in mind that the designer's chief aim in motor truck axle design is to take care of these tremendous reactions from side skidding, curb work, etc., it is difficult to appreciate the reasons for the automobile truck designer following the full-floating construction, where the centers on which the reactions are taken are so very close together, contrasting so widely with the semi-floating design—in fact, the difference in these designs is so radical, that it is hard to conceive of both of them being on right principles. Even forgetting principles for the moment, there is such a weight of precedent in favor of the semi-floating, that the writer can only come to the conclusion that the full-floating is only used on account of the accessibility of the driveshafts. If the full-floating construction had been adopted by railroad engineers for the same reasons, people who knew these facts would have a very creepy feeling when taking any long journey by rail.

We prophesy before very long that advertising men in the automobile field will not boost the full-floating axle on account of its accessibility, when driveshaft failures take place. It is infinitely better to put a driveshaft in there that will not break. This is the least that one can expect with our present knowledge of alloy steels and their proper heat treatment.

Full-Floating Impossible on Locomotive

Imagine locomotive designers starting out to design a full-floating axle for the locomotive itself, particularly on the main drivers. It would be considered by railroad engineers a practical impossibility. The bearings would be so large that there would be no spoke left in order to take care of the reactions when rounding curves, always having in mind that a choice of bearings is made from the side pressures at the rim of the wheel and not the straight static loads on the axle.

The illustration as shown in Fig. 1 is quite well known but clearly outlines the relative merits of each. The one with outstretched arms representing locomotive or semi-floating axle construction while the other represents full-floating or wagon practice.

Taking for granted that the locomotive, passenger and freight cars are all of the semi-floating or fixed hub construction and that the full-floating is horse-drawn practice (so far as its capacity for taking curves is concerned)

should the motor truck builder follow locomotive practice or revert to horse-drawn design? This is no reflection on the carriage axle—the present form of axle serves its purpose well for horse-drawn work, but this design would never do for real heavy haulage where speed is a consideration.

Again, on locomotive design the unsprung weight is really not a consideration on account of the very slight spring deflection due to the excellent condition of the road bed, but where such large unsprung weights have to be used as in modern worm drive axles, it is very much more essential that the semi-floating axles be used on trucks than in locomotive practice, as one of the principal items in the maintenance cost of heavy motor trucks is the tires consumed.

One of the most wonderful designs in the pleasure car world, noted for its exceptional gasoline economy and big tire mileage, attributes some of its success very largely to the semi-floating axle, full-elliptic springs and the Hotchkiss drive, particular attention being paid to reduction of weight at the wheel hubs themselves, even carrying this out as far as the rim and dispensing with the conventional demountable rim in favor of the fixed one in order to save weight where it is most detrimental.

Motor truck users who have had experience or even know of the above machine will expect the same relative tire mileages from their trucks and will certainly demand the lightest possible weight at the wheels on any axle equipment, even going so far as to condemn heavy cast malleable brake shoes and their attendant two-point contact, necessitating much heavier flanged and reinforced brake drums than are required with the self-intensifying band type of brake.

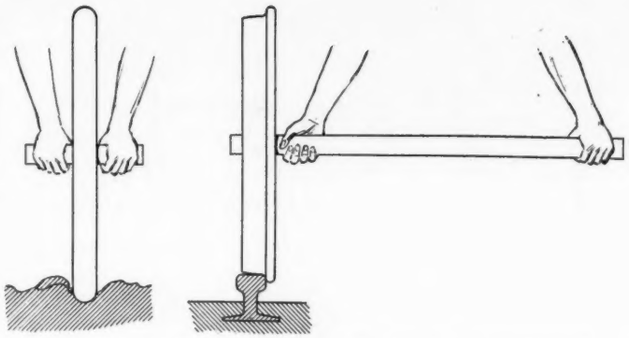


Fig. 1—Illustrating full and semi-floating axle arrangement

If all these considerations are being made in the pleasure car field, we prophesy that before long motor truck users will demand the same attention to details *for economy* of operation which has characterized the endeavor behind this design for the last nine years.

Solving Two-Cycle Problems

By Harmon J. Kline

THE recent articles appearing in the Forum of THE AUTOMOBILE seem to cover the pros and cons of the two-cylce motor situation pretty well. Some engineers are open to conviction while the majority seem to think the game isn't worth while.

The experience of most of these men appears to have been a matter of disappointment. My own experience was of about the same nature but still there is always a hope that luck will change. Theoretically the two-cylcle should begin to appear at this time since the performance of the multiple cylinder four-cycle motor may be had in the two-cycle type having only half as many cylinders and at a lower manufacturing cost. However, the hope seems a long way off if the opinions of the majority are to hold.

It is true that a motor using crankcase compression is troublesome, particularly with the low grade of fuel we are now getting. Oil leaks are also a bad feature and stuffing boxes a nuisance.

Probably a still greater disadvantage is the fact that a fresh charge from the crankcase must be forced into the cylinders at each cycle. I say "forced" because it must of necessity displace a sufficient quantity of dead gases in order that ignition may take place at all. However, this forcing process does not give good results in the ordinary type of two-cycle motor because the fresh charge always enters the lower end of the cylinders and part of it makes a bee-line for the exhaust ports. If the ports are carried around the cylinder walls far enough to allow a free escape of the dead gases, a greater proportion of the fresh charge is wasted for the sake of speed. So it is that in practice there seems to be a strata of inert gas at the top of the cylinder and one of fresh mixture at the lower end. The combination must be rich enough to allow ignition to take place, and it is obvious that trouble will ensue. At light loads the motor will four-cycle, back-fire or stop. At full loads the operation is better, but more fuel is wasted by passing out at the exhaust ports, due to the forcing process.

Is it any wonder that with raw fuel in the crankcase and a contaminated mixture in the combustion chamber, that the majority of engineers have hopelessly lost faith in any two-cycle type of motor?

If the cylinder action could be reversed properly without too much complication, I think the past reputation of the two-cycle motor would be better.

By forcing air into the upper end of the combustion chamber to scavenge the cylinder before forcing the fresh charge in, the motor will two-cycle under all conditions of load and speed. The motor may be flooded when using the overhead vaporizer so that dense clouds of smoke come out with the exhaust and yet it will two-cycle almost entirely.

When operating on gasoline with a carbureter I found out, under actual operating conditions, that back-firing would occur occasionally, due perhaps to a complete circuit of explosive mixture from the crankcase to the combustion chamber. However, the motor would not stall because the back-firing always occurred in one crankcase and the other would immediately fill the storage chamber with a fresh charge.

The motor was never known to back-fire when using the overhead vaporizer except when a valve cage in the piston came loose or a valve broke below the head.

As for starting on gasoline with a carbureter to the crankcase, starting is a bit difficult by hand but if a belt is run to the flywheel to give the same speed as an electric starter would give very little trouble was experienced. Perhaps the ordinary two-cylcle would start better now, even on our low grade gasolines with a starter but the two-cycle died before this day of extensive equipment.

Need for Cool Crankcase

As to running with hot crankcases. I think it would not be feasible to do so, particularly as means of lubrication cannot be so advantageously used in the two-cycle as the four and yet the four-cycle operates at too high a temperature to give absolutely reliable operation in the hands of the public. If some sort of cooling could be used to keep the bearings and oil at a comparatively low temperature it would be a good thing, especially with the two-cycle motor where a copious supply of oil is not advisable.

There is another point in favor of the two-cycle motor as applied to air cooling. That is the positively operated valve action. It is unnecessary to compensate for the difference in expansion of the cylinders and the push rods, valve tappets or valve stems as in the four-cycle motor.

The History of the Pneumatic Tire—16

Early Use of Pneumatic Tires on Automobiles and Other Vehicles—Motorcycles First Motor Vehicles To Use Them—Michelin's First Automobile Pneumatics

The History of the American Automobile Industry—43

By David Beecroft

PROBABLY suggested by The Lovell-Diamond advertisement of May, 1897, containing a cut showing letters on the tire of the wheel, an article appeared in one of the bicycle publications about this time, describing an advertising device, consisting of a bicycle wheel having the legend to be printed on the road formed in raised type on the tire tread. In April, 1898, the National Herringbone tire was advertised.

First Use on Automobiles

The first use on automobiles seems to have been the corrugated tread tires used on the Mark 111 Columbia in 1898. This vehicle was introduced in 1897 and may have used corrugated tires earlier than the date above mentioned.

For Horse-Drawn Vehicles

The increasing use of pneumatic tires very naturally suggested their application to other road vehicles than bicycles, and the application to sulkies by Elliott, Bidwell and Sercombe-Bolte has been mentioned. In the Winter of 1891-1892 A. H. Overman of the Victor Co. had his buggy fitted with ball bearings and the Victor arch or cushion tire which he was strongly advocating, and with which he was trying to stem the tide of favor sweeping toward the pneumatic. In the Spring of 1892, Bidwell fitted pneumatic tires to two Stivers runabouts and drove one of these himself about the city. This use seems to be the first use of pneumatic tires on horse-drawn vehicles in this country, if we omit the reported use of a carriage with Thompson tires in 1847.

First Use on Motorcycles

Since the motor vehicle developed so naturally from the bicycle which required better machine shops than did the carriage, it is to the motorcycles that we must look to see the first use of the pneumatic tires or motor vehicles. Most of these earlier motor attempts, however, were made on cushion or solid tires because the maker felt that the bicycle tires were not able to carry the heavier load. The first use on motorcycles seems to have been that of Pennington about 1894, who employed small wheels and having a very slow-running motor, with no flywheel, used quite large tires specially built for him to absorb as many as possible of the jolts. Pennington claimed earlier date than this, and this date is believed to be conservative. The *Blacksmith and Wheelwright* of September, 1894, describes an English four-wheeled car propelled by electricity having ball bearings, 24-in. wheels and pneumatic tires. Whether this use was earlier than Pennington's, is not known, but, being a four-wheeler, it more nearly approached automobile construction.

Early Use of Single-Tube Pneumatics

The first use of pneumatic tires on an automobile of accepted gage, wheel size and general road vehicle characteristics, as distinguished from cycle construction, seems to have been on the Duryea Chicago winner, which was fitted with single-tube pneumatics, 44 by 2 in. front, and 48 by 2 rear, about May, 1895. These single tubes were duplicates of others used by the Pope company on its horse-drawn delivery truck, carrying bicycles to the pay-station for some months before. Early in the same year, a New York hospital ambulance, weighing 1850 lb., had been fitted with Dunlop 3-in. tires; so these pneumatics were not chosen by Duryea until such tires had been proved capable of performing the work required.

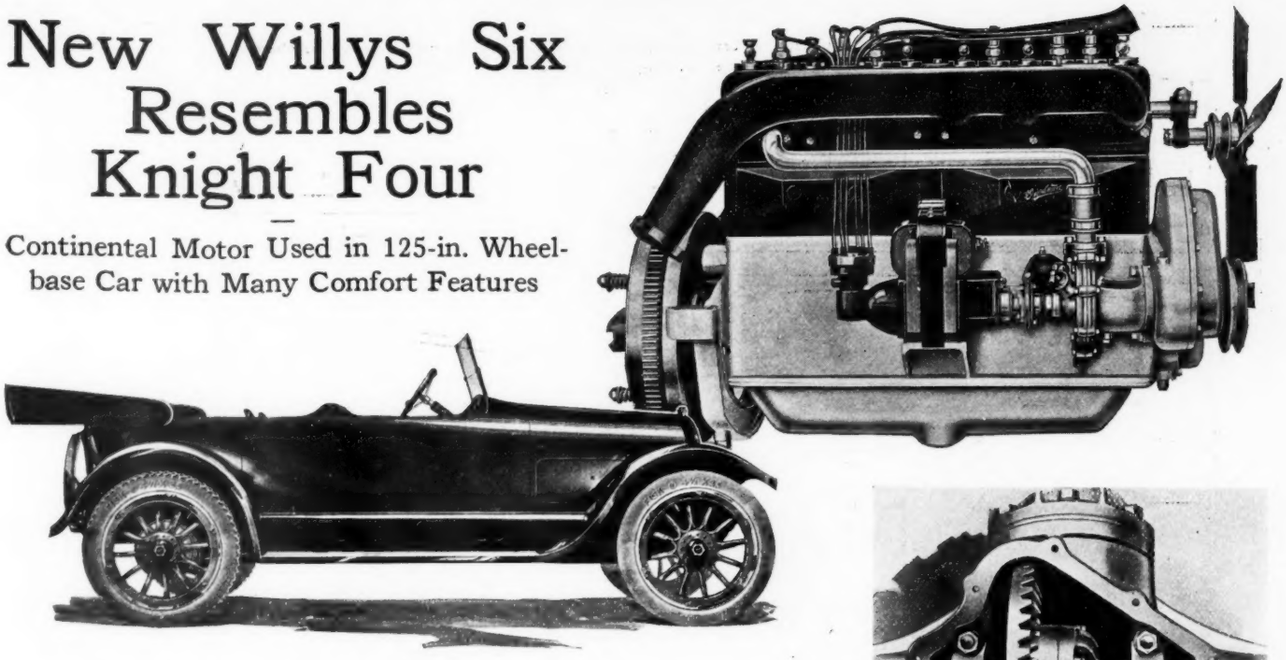
In an Early Contest

Morris & Salon built for the Chicago contest a skeleton bat which was fitted with wire wheels and pneumatic tires and is probably the second use of these tires in the United States. It is, however, hardly fair to compare this skeleton with a full-fledged automobile, for it was built for contest purposes only and was a cycle rather than an automobile.

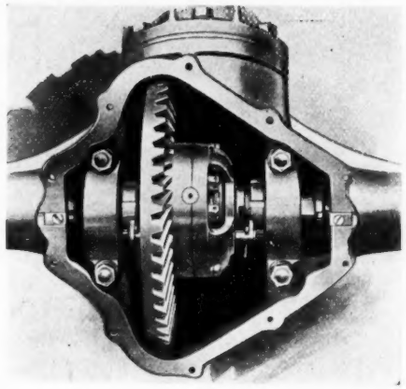
In the Summer or early Fall of 1895, Michelin, the well-known French tire maker, began to supply pneumatics for automobile use. It seems certain, therefore, that America led the world in the use of pneumatic tires, both on motorcycles and automobiles. More than a dozen Duryea cars were made during the winter of 1895-1896 and fitted with 34 by 2½ and 38 by 2½ single tube tires. The sale of several of these vehicles in June, 1896, and later constituted the first commercial transactions in pneumatic-tire automobiles.

New Willys Six Resembles Knight Four

Continental Motor Used in 125-in. Wheelbase Car with Many Comfort Features



Touring car and power plant on Willys 88 six chassis



Final drive in Willys axle, showing differential

WITH the exception of a longer hood, the new Willys seven-passenger 88-Six at $1,325 is identical in appearance with the Willys-Knight four recently described. Cantilever springs have been substituted for three-quarter elliptics, battery ignition made by Connecticut has taken the place of the magneto, the gearbox used on the 1916 Willys-Knight has been adopted, and the gasoline tank has been moved to the rear from under the seat, the change bringing with it the installation of a Stewart vacuum system. Continental motor, Auto-Lite starting and lighting, and the Tillotson carbureter are the same as heretofore.

Comfort and beauty are the features of the new car. The lines are unbroken from front to rear. The radiator edges are rounded, and the radiator is slightly higher, the top edge of the body is rolled in, and there is a double cowl and a tilted windshield. All these details combine to give a very attractive car.

Dark Blue with Nickle Trim

The body is dark blue, with gray wheels. Metal fittings are nickel and polished aluminum, and fenders and trimmings are black enameled.

The car is comfortable. The upholstery is unusually soft, due to the use of smaller springs, and because each one is in a canvas casing, which acts as an air chamber, giving a pneumatic-cushion effect. The body is roomier. There is plenty of knee room when the auxiliary seats are up. Cantilever springs, 48 x 2½ in., make this the easiest riding Overland, since it also has the longest wheelbase, 125 in. Larger tires than usual, 35 x 4½, contribute to the easy riding. The springs have been attached to the axle in such a way that the tendency is for the axle to roll backward slightly, thus reducing the force of the shocks.

The new motor will throttle down as low as 4 m.p.h. on high gear, and still run smoothly, and will pick up quickly from this speed without any difficulty. The ability of the car may be judged from the fact that the motor is rated at 45 hp., has a gear ratio of 4 to 1, and weighs 3515 lb. with all tanks full and a spare non-skid tire and rim.

The bore and stroke are 3½ x 5¼, giving an S. A. E. rating of 29.14 hp. and a piston displacement of 303 cu. in.

The motor is a standard Continental mode, with L-head cylinders cast in a block and mounted on a two-piece aluminum crank case, the lower part serving as an oil reservoir and the upper carrying the three-bearing crankshaft.

Accessibility is fostered by placing the ignition distributer and the generator and the water pump in a straight line on the right side. These units do not interfere with reaching the valves. Each is mounted on a bracket on the motor, and may be removed without disturbing the other.

This leaves the left side of the motor clear for the installation of the steering gear and the starting motor, access to both being easy. The oil-filler opening is at the front, on this side, and the oil gage is plainly visible from its position at the center near the bottom of the crankcase.

Electrical equipment consists of an Auto-Lite two-unit, six-volt system, with head, tail, and dash lamp, and headlight dimmers, as well as an ammeter.

The starting motor is mounted high in order to keep it away from dust and dirt, as well as to make it accessible, drive being by Bendix pinion, which meshes with teeth in the flywheel.

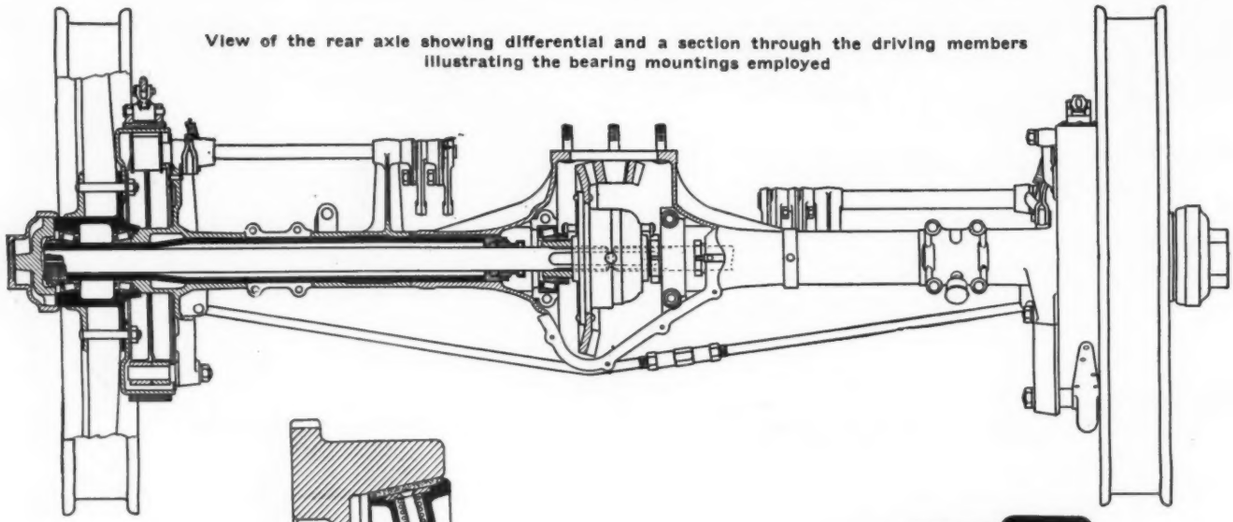
Back pressure is minimized by the fitting of a double exhaust pipe, there being a passage from the three front cylinders and another from the three rear ones.

Lubrication is a combination of force and splash feed, a plunger pump operated from the camshaft sending oil under high pressure to the main crankshaft bearings, camshaft bearings and the timing gears. Troughs catch the overflow and dippers on the connecting-rod caps distribute spray to all parts of the motor.

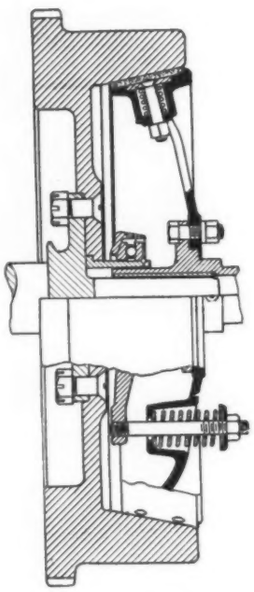
Leather Faced Cone Clutch

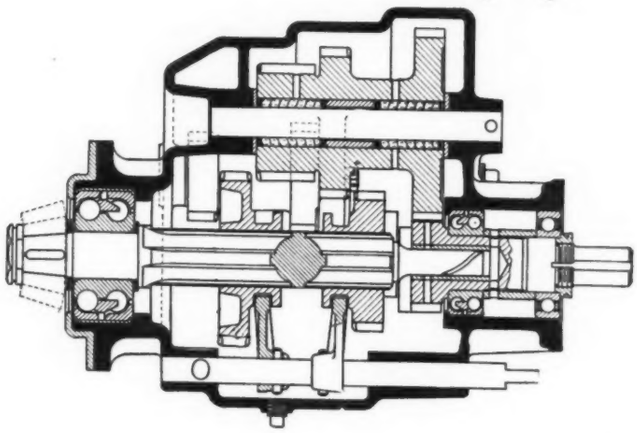
The clutch is a cone with a leather facing, and spring-actuated plungers which are equally spaced give smooth engagement by pressing out on the face. The clutch spider is held in engagement by three comparatively light springs

View of the rear axle showing differential and a section through the driving members illustrating the bearing mountings employed



Section through the leather faced cone clutch showing spring engaging members beneath the leather to give a gradual application and to ease starting shock





Three-speed gearbox used on the Willys model 88 six-cylinder car

placed near the rim, and gear shifting is facilitated by a clutch brake.

The gearbox is mounted on the rear axle, and torque and driving strains are taken by a torque tube which terminates in yoke, which is pinned to a cross member of the frame. The gearbox gives three speeds forward and reverse. The gears are double-treated nickel steel of the stub-tooth type. The main shaft is mounted on annular ball bearings and the countershaft is stationary, but the countershaft gears rotating on it have Hyatt rollers placed between them and the shaft.

The rear axle is a full-floating type with a spiral-gear drive, and Timken adjustable, taper roller bearings throughout.

Double Sets of Brakes on Drums

Service and emergency brakes are internal and external, acting on the same pair of drums, the former contracting and the latter expanding, the respective dimensions being 14⅜ x 2¼ and 14 x 2¼. Both are quickly adjustable.

The front axle is an I-beam drop forging, produced in one heat without welding, and the wheels have adjustable, taper roller bearings.

The steering gear is a worm and full-gear type of hardened steel. It is provided with ball-thrust adjustable bearings.

The doors are particularly easy to open, due to the use of a new handle, which is pulled in the direction to close the door. This movement is easier than that required to unlock the ordinary door, especially when the door is stuck. For the sake of cleanliness and safety, rubber pads with ridges on them have been placed on the running-boards under each of the four doors. They not only act as mud scrapers, but also give a firm foothold.

Light Pressure Releases Clutch

A very light pressure is required to disengage the clutch, merely the rocking of the foot on the heel being sufficient to depress the pedal. Horn button and ignition and lighting switches are placed in a box on the steering post, where they are easy to reach. Gear shift and emergency-brake levers may be operated without leaning forward. The two large pedals are adjustable as to length.

The cowl-board equipment is complete, including a Warner speedometer with ½-in. figures on the speed-indicating cylinder and ¼-in. figures on the 100,000-mile indicator and on the 100-mile-trip register. The latter may readily be set back by turning a small knob at the right. The oil gage registers up to 10 lb., and the ammeter has a range of 15-0-15 amp. A Boyce Motor-Meter relieves the driver of worry as to the condition of the cooling system.

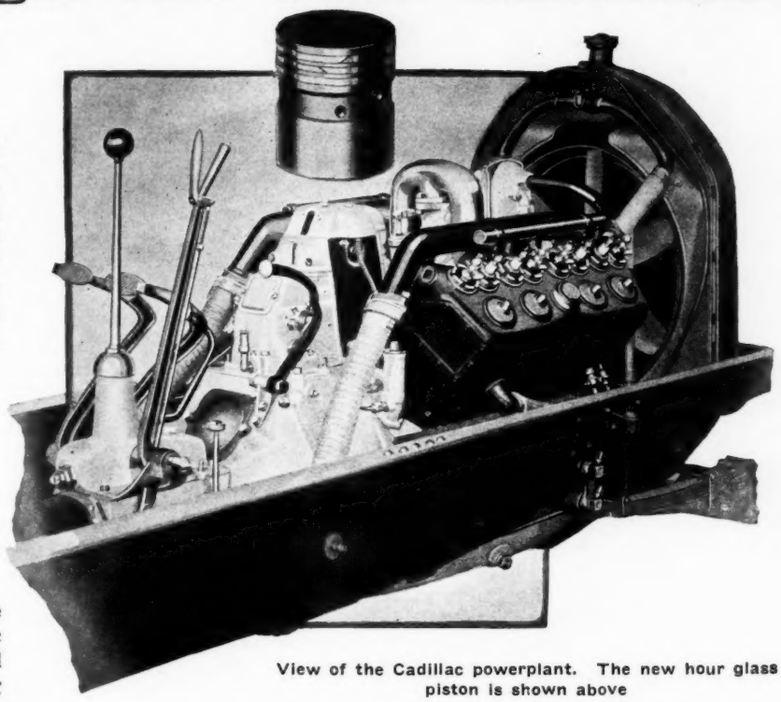
The body lines on this car are up-to-date and carry out a pleasing adaptation of the modern idea of streamline or moulded form. As will be noted there is little or no break at any point on the body as the cowl line joins the line of the body edge with an easy sweep. The rear of the body also rounds off in a graceful manner so that the lines of the car are distinctly long and low. When the top is down this lowness is accentuated, giving a very graceful form with plenty of room in the interior.

Cadillac 55 Longer and More Luxurious

Mechanical Changes of a Detailed Nature Giving Accessibility

FOR the third successive year the Cadillac Motor Car Co. ushers in its eight-cylinder car with no marked changes. There are some differences in the new Type 55 over the Type 53 which it succeeds, but these should be regarded more as refinements. Prices of the open models remain unchanged at $2,080; but the closed-body models, all built upon exactly the same chassis but of 132-in. wheelbase, are raised somewhat, due to the added cost of their manufacture.

Perhaps the most important difference in the new Cadillac is the lengthening of the wheelbase 3 in. to 125 in., a change which adds to the appearance of the car and increases its riding qualities at the same time. The rear of the body has been lowered somewhat, due to a little alteration in the bottom of the body in order to give it more clearance over the axle and also to some revamping of the top body line. These new features, together with the using of crowned fenders, make the new Cadillac the most beautiful car the concern has yet offered the public. As an added touch, there is a molding around the top of the body in the seven-passenger type, which sets it off in admirable shape.



View of the Cadillac powerplant. The new hour glass piston is shown above

Mechanically the changes are very few indeed. The motor has been fitted with new and lighter pistons which are somewhat on the hour-glass order in that the center is of smaller diameter than the top and bottom, thus reducing the bearing surface within the cylinders. There are a number of return oil holes drilled around this center portion to return any surplus lubricant to the crankcase, and, besides this, the wrist-pins have been enlarged somewhat as an added factor of strength. Last year's car had straight pistons. It is stated that the redesigning of the pistons and the slight refining of the rod assembly have resulted in the reduction of 1 lb. per rod and piston assembly, this meaning the two pistons, connecting-rods and bushing for any two opposite cylinders. This makes a net reduction of 4 lb. per motor due to the new piston design, etc.

Valves More Accessible

The valve alley between the blocks of cylinders has been made more accessible by redesigning the exhaust manifolds so that each is 1⅛ in. closer to its block of cylinders, a gain of 2¼ in. between these manifolds.

Due to the lengthening of the wheelbase the frame has been strengthened principally by making the side members 8 in. deep in the channel, an increase of 2 in. as compared with the previous model. This refers to the maximum frame depth, of course, there being the usual taper. A new feature in the frame also is the use of tubular cross-members at front and rear in place of the more generally used pieces of square or rectangular section. These, together with the deeper channel, make a more rigid frame that ought to be proof against any weaving that might be expected under severe road conditions. These tubular cross-pieces are not only stronger, but they are lighter than members of a different shape would be.

Another slight difference, which is nevertheless important in its effect, is the shifting of the torque arm from the left side of the propeller shaft to the right side, this being done to better absorb the torque of the motor, which turns from left to right. In the axle the mounting of the drive pinion shaft has been improved by placing both bearings ahead of the pinion itself instead of having one bearing either side of it, as in previous designs. This takes care of the thrust to best advantage.

These are all of the differences over the previous car, with the exception of several refinements that add to the convenience and comfort of the motorist as well as to the appearance. The tail lamp, for instance, has been redesigned so as to throw light upon the gasoline gage, making a very convenient detail at night. A splash shield now runs out horizontally at the front of the radiator and between the front ends of the frame, this giving better protection to the radiator than did the slanting guard formerly used.

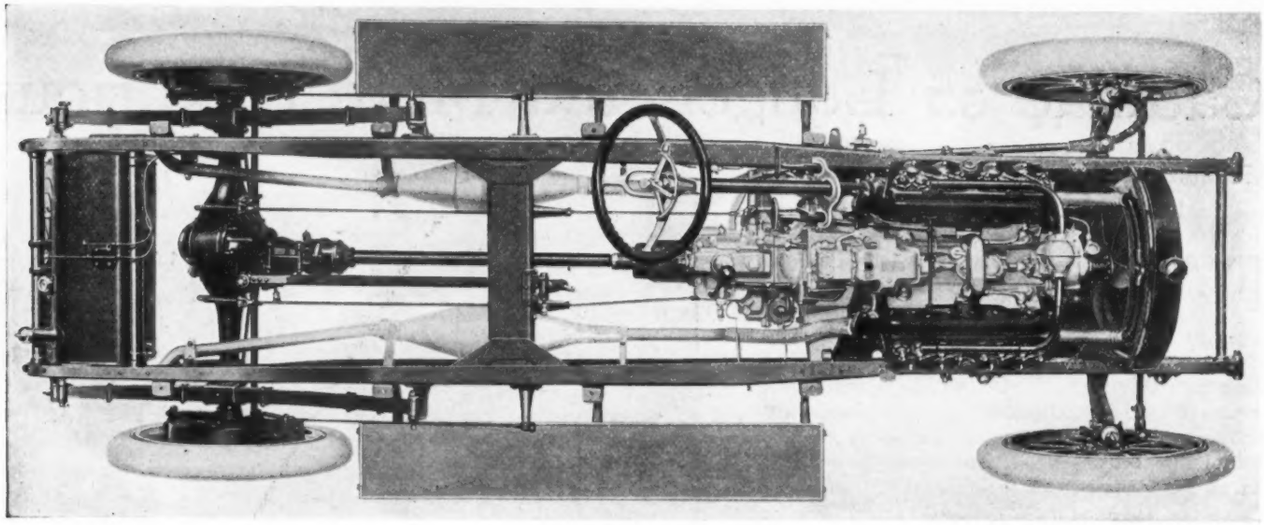
There has been a big upholstery change, adding materially to the comfort of the car. A new form of upholstery spring is used that is unusually soft, though it stands up well and will not settle. The leather is of dull grained variety instead of having a glazed finish, and in addition it is plaited instead of being tufted, undoubtedly adding to the appearance and comfort.

Head lamps of a new shape have been added, these having just a suggestion of the shape of the Cadillac coat of arms as it appears on the radiator and adding to the car's general good looks.

Gabriel snubbers swell the list of standard equipment, and are fitted both front and rear. A deep blue has been selected as the body color this year, taking the place of the dark green that was used on last season's cars. The color change, however, does not apply to the closed-body types; they still have a dark green paint.

Having summarized all of the important changes in the Type 55, it might be well to review the salient mechanical features of Cadillac construction for the benefit of those who are not familiar with them.

Since the Cadillac eight was first announced in 1914 there has been no alteration of the bore and stroke or of the motor



Plan view of the Cadillac model 55 chassis showing the accessible V powerplant and layout of the drive and torque members

basically. Cylinders have a diameter of 3⅛ in. and the stroke is 5⅛ in., giving a displacement of 314 cu. in. and a horsepower rating by the accepted formula of 31.25. This is nominal, for the motor will do well over 70 hp. on the block. In its general scheme the cylinders are in two blocks at 90 deg. and cast integral with the water jackets, heads and intake manifolds, making a simple construction. The aluminum alloy crankcase has the two blocks bolted to it in the usual fashion, and it carries the camshaft in its upper part, the crankshaft directly below the camshaft, and the oil reservoir at the bottom. A third shaft is placed vertically above the camshaft, this driving the Delco generator, ignition distributor and fan, and running in the alley between the cylinders. Actuation of the camshaft and generator shaft is by silent chains at the front, which are completely housed; and at the rear of the crankcase is the gearset, the bell-housing of which serves to complete the inclosure.

No Change in Principle

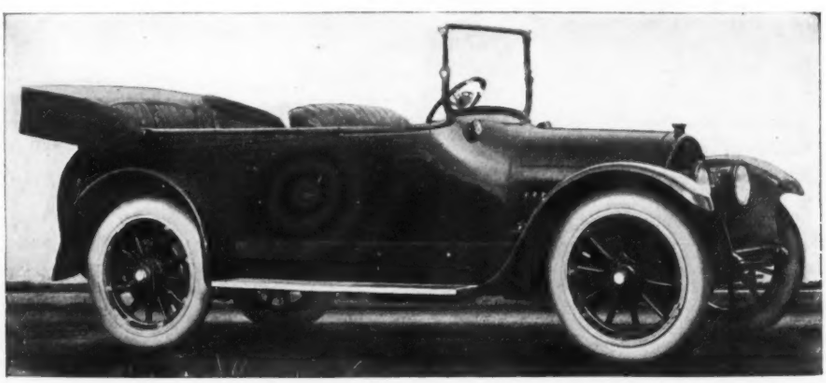
As the eight-cylinder type of engine is now known to the majority of persons, it need be said only briefly that the crankshaft is of the same form as used in a four-cylinder motor, only each throw bearing carries two opposite connecting-rod big ends instead of one. In the Cadillac adaptation the method of attachment of these two mating rods to the one bearing is by forming one rod with a yoked end and the opposite rod end of such width that it fits between the arms of the yoke. Two caps are, of course, required for the yoked end, one for each arm of the yoke; and in order to afford a proper bearing surface for each rod end the big-end rod is pinned to the outer ends of the bushing, while the other rod fits to the bushing within the yoke and is free to turn. Thus the bearing for the yoke rod is the inner surface of the bushing against the shaft, whereas that of the outer rod is the outside surface. of the bushing.

Valves in the Cadillac engine are actuated by only eight cams, each cam operating two opposite intakes or two opposite exhaust valves, as the case may be. The cam assembly is on the under side of a plate which bolts to the top of the crankcase between the cylinder blocks, and pivoted to this plate are sixteen rockers (one for each valve), these being interposed between the ends of the push-rods and the cams so that the lift will be straight upward along the valve instead of having a side thrust, as would be the case if the cam worked directly against the end of the valve rod.

Force-feed lubrication remains practically unchanged in the new model. A gear pump positioned at the front of the motor and driven from the crankshaft draws on the supply in the oil reservoir at the bottom and forces it through a reservoir pipe running along the inside of the crankcase, from which there are outlets to each of the main bearings.

Thermostatic control of the water temperature is still used, there being interposed in each water pump line a thermostat which automatically closes the supply of water from the radiator when the temperature gets below a certain level, causing the jacket water to circulate and recirculate through the cylinders until such time as the water temperature mounts to the height at which the thermostatic valve is opened and the whole supply of water admitted, permitting the circulation of the water as in any other motor. Incidentally, each cylinder block has its own centrifugal pump, driven off the end of a transverse shaft below the crankshaft, to which it connects by spiral gears.

Some of the other specifications include a multiple dry-plate clutch having fifteen carbon steel plates 7¾ in. in diameter; floating rear axle having spiral-bevel driving gears and a pressed-steel housing; tubular open propeller shaft with universal joint at either end; platform rear-spring suspension that has long been a Cadillac feature; 20-gal. gasoline tank with fuel fed to the carbureter by pressure; power tire pump attached to the side of the gearcase and operating through the gears. The tire equipment consists of 36 by 4½ smooth treads in front and non-skids in rear.



Cadillac 55 touring car which has been rendered more comfortable and lengthened 3 in.

ACCESSORIES

Forbes Extension for Fords

THE Forbes extension renders the Ford chassis 36 in. longer. The change is made by removing the body, rear mudguards, splash plates, running boards, gasoline tank, muffler and exhaust pipe and cutting both side members of the frame through at the middle of the car with a hacksaw. A channel is then hot-riveted and swedged into the opened section, thus lengthening the frame. A cross-plate of cast steel is arranged between the lengthwise members of the extended section to take the thrust of the driveshaft. Each side of the frame is trussed throughout its length with steel rods secured to steel brackets at the ends of the frame. An intermediate driving shaft is furnished, together with brake rod extensions, longer running boards and splash plates and all other parts required in making the installation. The capacity of the truck is 1500 to 1800 lb. Price, packed for shipment, $100; installed, $135.—Walter J. Forbes, 243 Columbus Avenue, Boston, Mass.

Hartman Automatic Switch

When the switch is used fuses are not required, according to the maker, for an automatic circuit-breaker is incorporated in the switch and is said to instantly open the circuit when a ground occurs, and positively indicates the fact by throwing out a small button below the switch key. To close the circuit again it is only necessary to push the button in, and if it remains in position it shows that normal conditions have been restored. The switch key may be removed with the lights burning, so that they cannot be tampered with in the absence of the driver. A similar type of switch is made for the ignition circuit, thus preventing the draining of the battery in case the switch should be turned on while the motor is stopped.—Hartman Electrical Mfg. Co., Mansfield, Ohio.

Faw Wiring for Fords

Several improvements have been made in the Faw wiring sets designed for Ford cars. The terminals, which were formerly soldered on at the end of the primary wires, have been displaced by self-made terminals, which are produced by looping the end of the copper conductor and soldering it. Thus a solid terminal is made integral with the wire itself. A copper ferrule protects the end of the insulation at this point. Another improvement is the elimination of the rubber nipples at the end of the flexible metal tubing, a metal ferrule which screws in place being used instead. The primary wires are of different colors so that they may be easily traced. The outfit consists of four high-tension ignition cables cut to the right length and provided with soldered terminals and four primary wires. Price, $1.—J. H. Faw, Inc., 41 Warren Street, New York, N. Y.

Hartman automatic switch

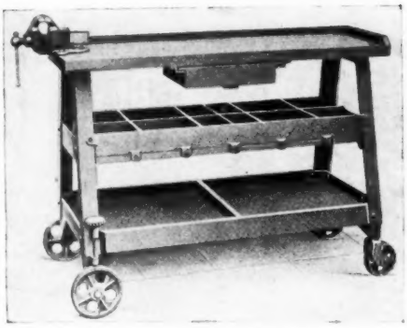
Howe searchlight

Howe Searchlight

The feature of this parabolic light, which is designed for mounting on the windshield, is the universal bracket, which has coil springs to provide a constant tension on the joints and thus holds the lamp firmly in place in any position. These springs, however, do not interfere with the ready movement of the lamp. The wiring is inclosed in the hollow bracket. Prices, $7.50; with rear-view mirror, $9.—Howe Mfg. Co., 61 East Twenty-fourth Street, Chicago, Ill.

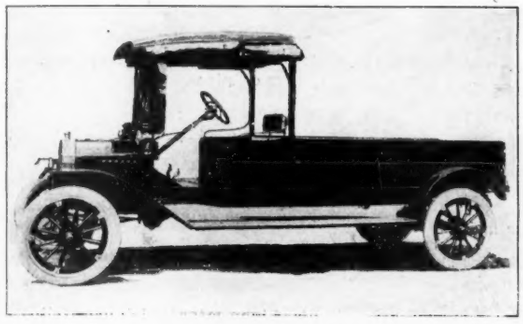
Manley Portable Bench

A floating machine shop is what the maker calls this bench. It is mounted on wheels on casters. The top is 12 by 44 in. and is equipped with a vise at one end as an extra. There is a drawer below the top of the table, and underneath are two shelves, the upper one having several compartments for parts of various sizes and the lower for heavier parts and tools. It should prove valuable in the repair shop, for it may be used right at the car, thus saving many steps. The construction is cast iron and steel throughout except for the top of the bench, which is wood.—United Engine & Mfg. Co., Hanover, Pa.


Manley floating machine shop

Economy Piston Ring

Economy piston rings differ from many in general use by not having pins to secure them in position. The illustration shows the method of joining the ends of the rings, with a tongue-and-groove device. They are concentric. In theory a concentric ring is said to insure equal bearing on the walls of the cylinder and consequently an even wear on the rings. This, and the absence of pins and loose parts, promote full compression, as the



Above—Forbes Ford extension. Right—Faw wiring

Anchor weatherproof top for Fords

ends of the rings can be sealed so tightly as to prevent any leakage whatever at the joint. The rings range in prices from 90 cents for 2½ to 3½ in. diameter, to $2.25 for 6 to 6½-in. diameter.—American Piston Ring Co., Minneapolis, Minn.

Anchor Tops for Fords

These tops are designed to be quickly attached to Ford cars, so that a closed car may be had for cold weather use and an open car for warm weather. The frame is of wood and the sides and back are glass. The doors of the top and car doors open together being operated by a single patented locking device. The interior of the top is upholstered and the windows can be lowered or may be removed and curtains substituted. Price, sedan $57.50, coupe $47.50.—Anchor Buggy Co., Cincinnati, Ohio.

Badger Tire Holder

This tire carrier is designed especially for the 490 Chevrolet, which is not regularly equipped. It is made to carry a single tire at the rear, and is suitable for a plain tire or one mounted on a wire wheel. It is attached to the rear body sill by through bolts. Price, per set, complete with straps, $3.25.

A new rear tire holder has been designed for Fords, consisting of a single drop arm which is clamped to the rear spring and from which extend two arms to support the tire at the side and also a central arm which carries the tail light and the license plate. Complete, without lock, $3.25, and with lock, $3.75.—Auto Parts Mfg. Co., Milwaukee, Wis.

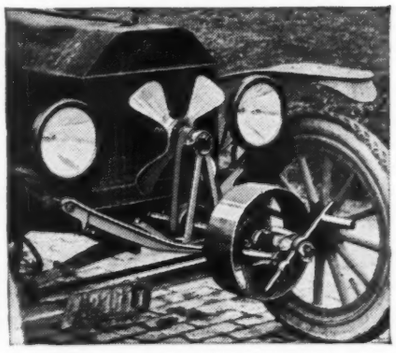
Mud Cover for Ford Cars

This is a new mud cover which slips on over the fenders, body and doors, and may be put on or taken off in 5 min. Waterproof material is used. Fasteners of the ordinary kind found on gloves are used. The covering protects the finish of the car against mud and water in wet weather.—Edward McClintock, Minneapolis, Minn.

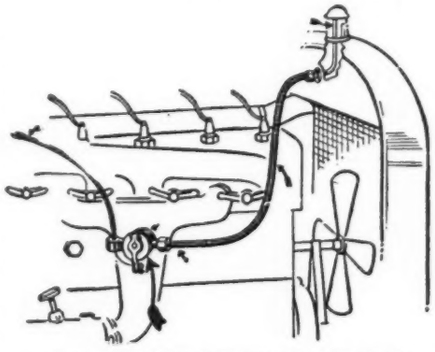
Apco Spring Leaf Lubricator

These lubricators consist of a pair of semi-steel plates with oil reservoirs and felt inserts, as illustrated. When in position the felt rests against the spring, keeping it lubricated without any attention except occasional renewal of the oil supply. The devices can be installed in 2 min. with a screwdriver. They are finished in black enamel and are tapped to take oil cups. The large size is 2 in. between bolts and the small 1½ in. Ford cars require four sets, two small and two large, while cars with full elliptic springs will need sixteen sets; semi-elliptic need eight; three-quarter with semi-elliptic front need ten, as do cars with platform springs. The lubricators sell for 30 cents per pair.—Auto Parts Co., Providence, R. I.

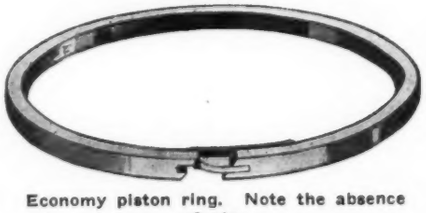
Badger tire holder



Autopower attachment for Fords



Vapo Humidifier supplies moisture to the carbureter



Economy piston ring. Note the absence of pins

Apco spring leaf lubricator which uses felt pads

Autopower Attachment

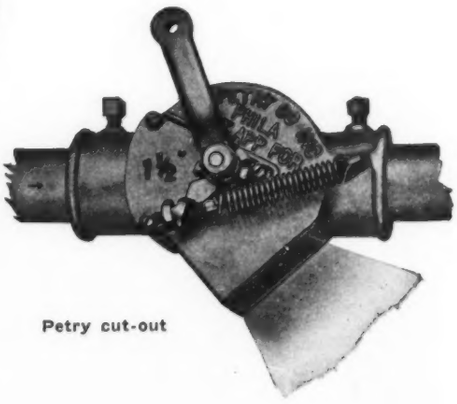
Power for driving stationary farm machinery may be obtained from a Ford by the use of this device, which consists of a pulley mounted in front of the radiator and which is driven from the crankshaft. A belt-driven fan supplies extra cooling. It may be attached without any drilling, the only tool required being the wrench. It is capable of supplying 10 hp. continuously, it is said.—Autopower Co., 965 Woodward Avenue, Detroit, Mich.

Vapo Humidifier

This device supplies warm, moist vapor to the manifold, the exact amount being controlled from the dash. It consists of a valve at the manifold from which runs a pipe to the filler spout of the radiator, from which point the vapor is procured. It is said to provide a better mixture and, consequently, to improve the power and smoothness of operation of the engine. Price, $5.—Auto Gas Saver Co., 29 South La Salle Street, Chicago, Ill.

Petry Cut-out

This cut-out is a damper type, one position of the damper deflecting the exhaust gases down into the open and the other position allowing them to pass through to the muffler. The valve may be readily removed for cleaning, and the tension of the closing spring may be varied to suit the requirements. Prices: 1¼ to 1¾ in., $3; 1⅞ to 2½ in., $3.50; 2⅜ to 3 in., $4.—N. A. Petry Co., Inc., Philadelphia, Pa.



Petry cut-out

The Automobile

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Federal Gasoline Report

NO one seems to be able to put his finger directly on the cause of the country-wide reductions in gasoline price That it is due to the investigation of the Federal Trade Commission is vigorously denied on all sides, but it seems quite a coincidence that the reduction comes just as the report is due. There has also been talk that the price has been forced down to allow the Standard Oil companies to buy up existing stores at bargain prices, but here again there is a cheerful indefiniteness about the reports.

Gasoline prices run in waves, and each time there is a rise or fall a host of explanations is always ready. The oil magnates cite the law of supply and demand, and yet a close investigation always seems to indicate that the ratio of demand has not varied much. It is to be hoped that the gasoline report from the Federal Trade Commission, which is just about due, will clear up a large part of this mystery.

Some of the oil men state, and very possibly with reason, that as soon as the oil demand rises to a high pitch all the little producers and independents all through the oil-bearing country immediately dig wells, and consequently the production goes up. In other words, it is a question of the production varying to meet the demand rather than a case of the demand being varied to meet the production. All over the country there are numerous wells of small output when taken singly or in small groups, but when the production of these wells is combined it makes a total that can very well swing the tide over toward a lower price scale. There is no doubt, also, that the automobilist is content with a lower-grade fuel now than he would have been a few years ago, because cars are being built that will burn the heavier grades satisfactorily.

Ford Service

FORD'S epoch-making announcement of an entirely new way of marketing automobiles, following closely on the heels of a deep slice into the price list, is so fraught with possibilities that it is only after the atmosphere begins to clear that the deeper significances of the plan become visible. Here and there the question is now being asked if the cut in price is not being made to some extent at the expense of a cut in service.

No doubt the new plan of merchandising will be more economical from every view point. If money is to be saved on service, that money will be left in the pockets of purchaser as well as in the coffers of the Ford company. When a man buys a plow or a lawn mower he does not ask the dealer searching questions regarding service for the implements. He knows that, having been built by a large factory that expects to continue in business, the service feature goes without saying. He knows that through any dealer handling the product of the large manufacturing organization he can buy or order parts.

The low-priced car is as much of a utility device as the lawn mower and the plow. Its use is just as widespread and general. Therefore, it is but natural that, since the marketing method of the car will follow out the plan found desirable in other lines of utility hardware, the service method will do likewise.

Stronger Financing

THE era of prosperity which has swept through the automobile industry, and which is still continuing its sweep, has brought about a result that will be appreciated should a period of depression ever ensue. It has always been said that many of the larger automobile manufacturing companies did not have sufficient reserve. This condition, if it ever in reality existed, is past. Almost each week there is some increase in capitalization among representative concerns in the industry to enable policies of expansion to be carried out.

In addition to expansion, most of the companies are building up a reserve that will prove a tower of strength should a period of need ever arise. Some of the increases made this year are a striking commentary on the vastness of the resources of the country and the tremendous buying power that has still been practically untapped. Larger schedules of production are being announced on every side for the new fiscal year. In spite of the quick growth, a soundness and firmness is being manifested which puts the industry in the best possible light before the banking interests of the country.

Judge Investigates Headlight Device

—

Makes First Bonafide Decision in Mass., Stating Warner Lenz Complies with Law

BOSTON, MASS., Aug. 19—The first judicial decision on the headlight law where a judge went out for himself and made an inspection of a device was rendered in the Boston courts yesterday when Judge John Perrins, Jr., stated that the Warner lenz complied with the Massachusetts law.

The importance of the decision lies in the fact that a judge has really passed upon the matter after a demonstration. Heretofore the judges sat in court and heard policemen say a light dazzled even if it had a device on it, and the officer's word was accepted, and the motorist fined or his case filed. But no judge would take the trouble to investigate the claims of the motorists. They seemed to hedge on the question when attorneys tried to fight the cases.

The Highway Commission refused to approve any device because the devices were so made that improper focusing defeated the purposes of the inventor. When the case of the Warner Lenz came before Judge Perrins the attorneys laid much stress upon the fact that the judge should investigate the facts rather than rely upon the policeman's word. Judge Perrins said it seemed fair, and a trial was made one evening. The judge was convinced the Warner was not a lawbreaker.

In his decision he said: "The fact is that a certain space must be illuminated, according to the law, and a certain strength of light must be used for this purpose. When space 150 ft. away must be made light, the illuminating source must be accordingly brilliant. But I find this light not to be dazzling." In a former case with a Frecto device he discharged the defendant, but said that it may have been possible to break the law by improper focusing of the bulbs. If other judges follow Judge Perrins' lead and make investigations for themselves the police and the motorists will then know just where they are at. Police officials accompanied the judge on his trip in the Boston parkways while making his tests.

—

A. L. Westgard to Build Tires

YOUNGSTOWN, OHIO, Aug. 18—A. L. Westgard, well known in this country as an authority on good roads, is at the head of a new company which will build tires. He has formed the Westgard Tire & Rubber Co., with a capital of $1,500,000, and will locate a plant on a site of 4½ acres just northeast of Warren.

The concern has its building plans completed and is at present negotiating with contractors for the erection of the plant. Concerning the operations at the new plant, it is stated that 400 tires will be the daily production and 200 men will be employed at the start.

Mr. Westgard is president of the corporation. Other officers are: A. E. Gordon, vice-president and manager, and F. A. Vallbrecht, treasurer.

Mr. Westgard is well known in this section. For many months past he has been connected with the National Good Roads' Assn., and in the interests of the organization has made twelve trips across the continent.

—

Denmo Is New Truck

CLEVELAND, OHIO, Aug. 21—A new assembled truck to be called the Denmo has just been put on the market by the Denneen Motor Co., this city. The truck sells for $1,385 chassis, and is rated to carry 1¼ tons. It has a Splitdorf-Aplco lighting and starting system as stock equipment. The engine is a Wisconsin four, 3¾ by 5 in. and transmission is through a three-speed gearset to a Torbensen internal gear axle. There is a governor driven from the propeller shaft, so that it is the truck speed and not the engine speed which is controlled. Special pains have been taken with the thermo-syphon cooling system, the radiator, a Fedders, being mounted on a cushion base which gives it a more widely spread support than the usual spring brackets at the lower front corners.

Nine feet of loading space are provided, the wheelbase being 124 in., but it is stated that the truck will turn in 21 ft., as a very wide steering lock.

—

Pays Customer for Broken Parts

INDIANAPOLIS, IND., Aug. 21—A novel service policy has been started by the Fisher Automobile Co., local Reo dealer. This company has advertised that all parts broken in normal service within 1 year from delivery date will not only be replaced promptly free of charge for material and labor, but it will, in addition, pay to the customer an amount equal to the price of the new part as shown in the price list, as compensation for the annoyance and loss of time.

—

U. S. Advocates System

WASHINGTON, D. C., Aug. 21—The Federal Trade Commission which was formed to better trade conditions and relations has taken a deep interest in accounting systems and has issued two pamphlets covering the principles of accounting. One pamphlet is for manufacturers and the other for retailers. These do not advocate the use of any particular system, but urge greater attention.

Overland Adds $15,000,000 to Capital

—

$7,500,000 Has Been Sold and Remainder Is Being Underwritten

NEW YORK CITY, Aug. 23—The Willys-Overland Co., Toledo, has increased its capital from $22,500,000 to $37,500,000 by the sale of $15,000,000 of its common stock held in the treasury to J. S. Bache & Co., and C. D. Barney & Co.; $7,500,000 of this has already been sold and the remainder is being underwritten. The new stock will carry a 5 per cent stock dividend declared payable on April 2, 1917, to stockholders of record on March 15, 1917.

Common shareholders of the Overland company may subscribe at $44 a share to the new stock, two-thirds of a share of the new for each share held. There is also outstanding $15,000,000 of 7 per cent preferred, convertible into common stock.

The preferred shareholders, under the law, have no right to subscribe to any part of any new issue of common stock, but in view of the fact that the preferred stock is convertible into common stock, Mr. Willys has waived, in favor of the preferred shareholders, a sufficient amount of the stock to which he has the right to subscribe, to permit of an offering to the preferred stockholders of one share, par value $25, for each share of preferred stock outstanding.

The new common stock is worth about $2.50 a share less than the stock now outstanding, since the 10 per cent common stock dividend ordered on July 12 last is payable 5 per cent on Oct. 2 next and 5 per cent on April 2, 1917. As stated above, the new stock will not carry the 5 per cent payable in October.

After the receipt of the proceeds of the $15,000,000 of stock, the Willys-Overland Co. will have approximately $15,000,000 of cash and $30,000,000 of other strictly quick assets, with no liabilities other than strictly current monthly bills. The earnings of the corporation on a basis of the first 6 months of this year are approximately 40 per cent upon the par value of the common stock, including that proposed to be issued.

Proceeds from the new stock issue will be used to provide for the company's present requirements, for future growth, to insure prompt delivery of all orders, and to permit of increased disbursements from time to time in the way of dividends.

The company has an authorized issue of $50,000,000 of stock, that amount having been fixed upon, according to a statement issued by the bankers, in order to furnish adequate capitalization for the

growth of the business. Deliveries of cars for the first 6 months of this year were 94,477, being more than for the entire year 1915. The company is now approximately 25,000 cars behind in actual deliveries of cars sold.

Broken Marmon Seals Due to Road Contact

INDIANAPOLIS, IND., Aug. 8—The Nordyke & Marmon Co., this city, has made a statement in regard to the report of the Automobile Club of America on the examination of the Marmon car which established a record between New York City and San Francisco in 5 days, 18 hr. and 30 min. The club had placed seals and marks of identification on the car before its departure and on its return found certain of these broken. These seals that were missing, according to the Nordyke & Marmon Co., were so placed that they came in contact with the road, and were in this way either broken or torn away. The breaking or loss of these seals, under the circumstances, is not significant, being due entirely to an unfortunate choice of position and not for the purpose of making repairs.

The report shows the original wheels were missing. Inasmuch as wire wheels, standard equipment, were used, changes were made quickly by taking the wheels with the tires mounted completely off and substituting others with inflated tires.

King Making 2-Week Run

WASHINGTON, D. C., Aug. 19—An 8-cylinder King touring car is making an unofficial 2-weeks' non-stop run on the boulevard between this city and Baltimore. The start was made at noon, Aug. 12, from the plaza fronting the United States Capitol, and at the conclusion of the first 168 hours' run had a mileage of 3515 miles. The gasoline consumption has averaged 12.126 miles to the gallon. Ankeny and Ldutbecher are alternating as drivers. Edelen Bros., of this city, and J. Stewart Smith, of Baltimore, are promoting the run.

Pullen Will Captain Five Mercers

SANTA MONICA, CAL., Aug. 21—Eddie Pullen will captain a team of five Mercers in the Vanderbilt Cup and International Grand Prize races.

Sixteen-Valve Stutz Roadster Ready

Car Featured by Getaway and Silence—Remains Cool with Retarded Spark

INDIANAPOLIS, IND., Aug. 22—The Stutz Motor Car Co. announces a new speedster model in which will be installed a sixteen-valve, four-cylinder D-head motor. Experimental cars have been on the road since Stutz first introduced the sixteen-valve motor in racing cars, and rumors have been current for some time that the motor would eventually be marketed. The speedster model alone will have the new motor, the four- and six-passenger and roadster bulldogs continuing with the eight-valve motor as stated previously in THE AUTOMOBILE. A representative of THE AUTOMOBILE drove the car and the motor is as quiet if not more so than the eight-valve Stutz. Although twice as many valves are in operation, the second set seems to have been quieted to the minimum.

The car has a getaway rarely equaled in a four-cylinder motor. The acceleration has a smoothness comparable with an eight or a twelve. One of the speedsters was driven a distance of 5 miles on high gear with throttle half open and the spark fully retarded. At the conclusion of this test the radiator was still cool enough so that the hand could be kept on the shell without discomfort. The stock car will easily attain a speed of 75 m.p.h. The motor has a bore and stroke of 4⅜ by 6 in.

The cylinders are cast in a single block, which is a departure from previous Stutz practice. The exhaust ports are separated, there being eight ports extended into the manifold. The crankcase is aluminum and the breather is so designed that oil vapor cannot escape and thus dirty the parts.

Ball bearings are used in the pump and magneto shaft bearings. The crankshaft is three bearings. Valves are operated by roller lifts. Cooling is by centrifugal pump and lubrication is force feed through the hollow crankshaft. Pistons are lubricated from the main and rod bearings. The push rods and valve springs are inclosed by aluminum cover plates held in place by wing nuts, allowing removal of the plates without need of tools.

Woman Crosses Continent in 11.23 Days

NEW YORK CITY, Aug. 19—What probably sets a new mark for women drivers was established when Miss Amanda Preuss arrived here to-day, having driven an Oldsmobile stock eight roadster across the continent in 11 days, 5 hr. and 30 min. Miss Preuss was alone in the car and was checked out of San Francisco on Tuesday, Aug. 8, by Major Hilton of the U. S. artillery. The route followed was the Lincoln Highway which, with detours, gave a total of 3600 miles. The longest continuous run was 580 miles from Cheyenne to Council Bluffs.

Master Carbureter Co. Holds National Economy Test

DETROIT, MICH., Aug. 22—The Master Carbureter Corp., this city has just finished a nation-wide economy test with its carbureter in which over 200 of its dealers participated.

The results of the tests appear in the following tabulation and take up a few of the most important cities:

Car	City	M. P. G.
Pope-Hartford	Phoenix, Ariz.	31 7/10
Overland 83	Nashville, Tenn.	15 3/8
Overland 59	San Francisco, Cal.	20
Cole	Portland, Ore.	12 4/10
Haynes	Salt Lake City, Utah	22 4/10
Buick	Los Angeles, Cal.	22 3/10
Dort	Boston, Mass.	28
Ford	Tulsa, Okla.	24
Paige	Spokane, Wash.	25

Doble Steam Car in Detroit

DETROIT, MICH., Aug. 21—Abner Doble, expert on steam automobiles, who was at one time consulting engineer for the Stanley Motor Carriage Co., makers of steam cars, and who has spent a number of years in the development and perfection of steam propulsion of motor cars, is in Detroit. He has associated with him C. L. Lewis, former president of the Consolidated Car Co., and M. J. Hammers, also connected with that organization. The General Engineering Co. has been organized with a capital stock of $200,000 to market a high class car after Doble's designs.

Resta Easily Wins Speedway Grand Prize

(*Continued from page* 310)

get his car working right and finally withdrew at this point after having been a poor tail-ender in each of the first four heats. He managed to run the requisite five laps each heat, however, and worked on his car between heats to get the kinks out of a valve that insisted on sticking.

There was little contest for first place in the final 50-mile dash, Resta taking the lead at the start and never giving it up but once—at the end of 36 miles Lewis lead but only for a few hundred feet. Likewise there was no doubt from the first who would be the last to finish, for D'Alene could not get his Duesenberg to perform as he had earlier in the race. Resta was never far ahead of Lewis, Buzane and Galvin. These four kept well bunched and the latter three vied with each other for second place and furnished most of the thrills for the final heat. For example, Lewis crossed the tape ten times in second place; Galvin eleven times, and Buzane three. Lewis was third across the tape five times, Galvin ten times and Buzane ten. Fourth place was held by Lewis nine times, Galvin four times and Buzane twelve times.

Security Prices Are Steady

Firestone Common 20 Points Higher—Chalmers Common Rises 10 Points

NEW YORK CITY, Aug. 22—Automobile and accessory issues continued active and strong last week. The tire issues were especially active and several of them made substantial gains. Firestone common featured with a gain of 20 points and closed yesterday at 935. Goodyear common rose 2 points, Kelly-Springfield 2¼ points, Portage 15 points, and U. S. Rubber 2⅜ points.

Chalmers common featured the automobile issues with a 10-point gain, reaching 170. Chevrolet experienced a setback yesterday and dropped to 198, a loss of 14 points for the week. General Motors common also closed yesterday at a loss, this being 10 points.

Springfield Body saw a good demand and rose 10⅛ points as a result of the announcement that the company's earnings are running at a rate equivalent to over 43 per cent on the $1,500,000 common outstanding.

Peerless advanced to 25½ at a gain of 3½ points. This company has just received a large truck order from the Allies.

General Motors preferred reached a new high record of 123 yesterday. It is reported that this company is about to recapitalize on the basis of $75,000,000 common.

Saxon stock rose to 77 at a gain of 5½ points. This company has just announced a large production for the coming year with a large part of it already contracted for. Changes on the Detroit Stock Exchange were for the most part small, ranging from a fraction to 2 points higher. Studebaker common rose to 129½, a gain of 2 points. Maxwell common also rose 2 points, quoting at 82½.

Both the first and second preferred of the Maxwell company rose 1½ points.

Lead and Steel Higher

NEW YORK CITY, Aug. 22—The rise of lead and open-hearth steel featured last week's market activities. Lead rose 70 cents per 100 lb. and Bessemer steel rose $2.00 per ton. Lead quoted yesterday at $6.75 and Bessemer steel at $45.00. The rest of the metals were steady and in good demand. This was especially so with copper which is being ordered for November and December delivery.

Rubber prices were also higher yesterday in sympathy with the rise on the London market. The price of hard Para moved more or less in sympathy with that of plantation, but it has remained at a comparatively high level, due to the restricted supply available. Last week Para rose to 67½, a gain of 1 cent a pound, while Ceylon rose 2 cents to 58½ cents.

Enger Announces New Financing

One Share of 7% Preferred and Two Shares Common for $105

CINCINNATI, OHIO, Aug. 21—The Enger Motor Car Co., this city, which recently took over the Frank J. Enger Co. for the purpose of handling the company's increased business, this week elected the following officers, all of Cincinnati: F. J. Enger, president and general manager; Daniel McLaren, first vice-president; E. L. Jones, second vice-president; and G. W. Platt, secretary-treasurer. The company will begin at once the erection of an additional building which will give it a capacity of 7500 cars per annum.

The directors are as follows: F. J. Enger, E. L. Jones; D. C. Keller, president of the Dow Drug Co.; R. H. Wurlitzer, president of the Rudolph Wurlitzer Co.; L. R. Marks, president of L. R. Marks Co.; Daniel McLaren, president of the Hamilton County Bank; R. B. Goodrich, president of the Engle Mfg. Co.; F. E. Wesselmann, County Commissioner and President First National Bank of Cheviot; A. A. Taylor, vice-president the Stearns & Foster Co.; W. B. Hay, president the Hay Lumber Co.; Edward Ritchie, president the Guarantee Deposit Bank; and

Automobile Securities Quotations on the New York and Detroit Exchanges

	1915 Bid	1915 Asked	1916 Bid	1916 Asked	Wk's Ch'ge
Ajax Rubber Co. (new)	..	..	64⅞	66	+ ⅞
J. I. Case pfd	70	79	84	87	+1
Chalmers Motor Co. com	89	92	170	176	+10
Chalmers Motor Co. pfd	94	97	97	102	—1
*Chandler Motor Car Co	..	..	104	106	..
Chevrolet Motor Co	..	..	198	205	—14
Essex Motor	..	..	74	77	..
Fisk Rubber Co. com	..	..	..	150	..
Fisk Rubber Co. 1st pfd	..	..	..	..	..
Fisk Rubber Co. 2d pfd	..	..	..	..	..
Firestone Tire & Rubber Co. com	518	525	935	945	+20
Firestone Tire & Rubber Co. pfd	111	..	112	113	..
*General Motors Co. com	202	207½	560	585	—10
*General Motors Co. pfd	106	107	122	122½	+4
*B. F. Goodrich com	55	57	72¼	72⅞	+ ¼
*B. F. Goodrich pfd	107	108	113½	114⅛	+ ½
Goodyear Tire & Rubber com	271	275	235	239	+2
Goodyear Tire & Rubber pfd	108½	110	106½	107¼	+ ¼
Grant Motor Car Co	..	..	7½	8½	..
Hupp Motor com	..	..	6½	7	..
Hupp Motor pfd	..	..	80	110	..
International Motor Co. com	23	25	6	8	+1
International Motor Co. pfd	50	52	15	20	+2
*Kelly-Springfield Tire & Rub. com	174	177	72¼	72¾	+2¼
*Kelly-Springfield Tire & Rub. 1st pfd	85	87	96	97	..
Kelsey Wheel pfd	..	..	100	100	..
*Lee Rubber & Tire Corp	..	..	45½	46½	+ ½
*Maxwell Motor Co. com	40	41	84⅛	84¾	+2⅝
*Maxwell Motor Co. 1st pfd	86	87	85	87	— ½
*Maxwell Motor Co. 2d pfd	34	35	57	57½	+1¾
Miller Rubber Co. com	..	195	220	226	—5
Miller Rubber Co. pfd	107	107½	105	106	+1
Mitchell Motor	..	..	65	67	..
Motor Products	..	..	62	68	..
Packard Motor Car Co. com	112	119	170	176	+5
Packard Motor Car Co. pfd	99	100½	99	103	—1
Paige-Detroit Motor Car	..	..	46	47	+1
Peerless Truck & Motor Corp	..	..	25½	26½	+3½
Perlman Rim Corp	..	..	..	..	..
Portage Rubber Co. com	42	..	130	135	+15
Portage Rubber Co. pfd	92	94	130	135	+15
Pratt & Whitney	..	..	104	106	..
Princess Motor Corp	..	..	1	1⅛	..
Regal Motor Co. pfd	..	..	17	22	..
Reo Motor Truck Co	17	18	35	36	— ½
Reo Motor Car Co	32½	34½	42½	43½	+ ¾
Saxon Motor Car Co	..	..	77	78	+5½
Scripps-Booth	..	..	50½	50½	—1
Springfield Body	..	..	81⅛	85	+10⅛
Standard Motor Co	..	..	6	6½	+ ½
Stewart-Warner Speed. com	65½	67	103¾	104¼	+1¼
Stewart-Warner Speed. pfd	105	107	..	..	..
Stromberg	..	..	44¼	44½	+1
*Studebaker Co. com	99	101	129¾	130½	+1¼
*Studebaker Corp. pfd	102	103	109	111	..
Stutz Motor	..	..	65	66	..
Swinehart Tire & Rubber Co	85	90	95	100	—5
United Motor Corp	..	..	64	64½	—1⅛
*U. S. Rubber Co. com	48½	50	57¾	58	+2⅜
*U. S. Rubber Co. pfd	104	105	110¼	112	+ ¾
White Motor Co. (new)	..	..	53¾	54¼	+1¾
*Willys-Overland Co. com	169	171	55	55½	+1½
*Willys-Overland Co. pfd	105	106½	103¾	104¾	+ ¾

*At close August 21, 1916. Listed New York Stock Exchange.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	1915 Bid	1915 Asked	1916 Bid	1916 Asked	Wk's Ch'ge
Auto Body Co	..	..	36¾	38½	+ ¼
Chalmers Motor Co. com	88	..	..	165	..
Chalmers Motor Co. pfd	96¼	97¼	..	103	..
Continental Motor Co. com	270	295	35½	37	—1½
Continental Motor Co. pfd	83	86	9½	10½	..
Ford Motor Co. of Canada	1490	1525	..	344	..
General Motors Co. com	211	216	540	600	..
General Motor Co. pfd	107	109	116	121	+1
Maxwell Motor Co. com	43½	46	82½	85	+2
Maxwell Motor Co. 1st pfd	89	91	85½	88½	+1½
Maxwell Motor Co. 2d pfd	36½	38	56	59	+1½
Packard Motor Car Co. com	115	..	..	172	..
Packard Motor Car Co. pfd	99½	..	101	104	..
Paige-Detroit Motor Car Co	..	..	..	52	..
W. K. Prudden Co	20¼	22	..	..	..
Reo Motor Car Co	33	33¾	42½	43½	+ ½
Reo Motor Truck Co	17⅜	18⅛	35¼	36¼	..
Studebaker Corp. com	107	110	129½	132½	+2
Studebaker Corp. pfd	105	108	105	..	..
C. M. Hall Lamp Co	..	..	..	30	..

INACTIVE STOCKS

Atlas Drop Forge Co	27	30	30	..	..
Kelsey Wheel Co	205	..	55	60	..
Regal Motor Car Co. pfd	21	..	17	..	..

G. W. Platt, secretary-treasurer the Block & Platt Co.

The new company has an authorized capital of $4,000,000, divided into $1,000,000 of convertible preferred stock and $3,000,000 common. One million dollars of the common is reserved for the conversion of the preferred.

The stock is offered on the basis of one share of the 7 per cent convertible preferred, par $100 and two shares of the common, par $10 each, for $105. The preferred is convertible into common, at the option of the holder, at any time prior to July 1, 1918.

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Receiver for McClurg Tire Co.

COSHOCTON, OHIO, Aug. 21—Dr. H. R. McCurdy is appointed receiver for the McClurg Tire & Rubber Co. The receiver's bond was fixed at $25,000 which was given and the receiver took charge. The suit was brought by Jesse McClain, J. S. McClurg, and Dr. L. C. McCurdy. Inability of the company to market its automobile tires is given as the cause for the receivership. J. L. Rue, M. A. McConnell and C. H. Howell were named as appraisers.

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Allard on Torpedoed Ship

TORONTO, ONT., Aug. 12—M. L. Allard, assistant superintendent of the Dunlop Tire & Rubber Goods Co., Ltd., has just returned to Toronto after a most adventurous trip to Europe and the Far East for the Dunlop company. Mr. Allard was the only Canadian passenger on board the Yasaka Maru when that liner was torpedoed in the Mediterranean. Mr. Allard lost everything and was for hours drifting around on a raft. Finally the party were picked up by a passing steamer.

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Redden Truck to Expand

DETROIT, MICH., Aug. 21—The Redden Motor Truck Co. has recapitalized at $500,000 in order to expand its business. It manufactures an attachment for making a Ford into a 1-ton truck.

Capt. Lewis Pays L. P. C. Debts

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Personal Pledge of 100% to Creditors Redeemed in Full

RACINE, WIS., Aug. 19—Capt. William Mitchell Lewis, former president of the Mitchell-Lewis Motor Co. and later the moving spirit in the L. P. C. Motor Co., Racine, Wis., has fulfilled his promise to creditors of the L. P. C. company that all claims would be paid at 100 per cent of value, regardless of the amount accruing from the sale of assets.

The L. P. C. Motor Co. made a voluntary assignment 11 months ago. At that time Capt. Lewis gave creditors his personal pledge that none would lose even a penny in the transaction. On Aug. 16, last, the assignee, F. Lee Norton, filed in circuit court his report of receipts and disbursements, amounting to $102,000. It was stated that preferred creditors were paid in full some months ago, and checks were mailed to other creditors on Aug. 15 for 100 per cent of their claims, although the sale of assets gave general creditors only 23.7 per cent of claims. The referee states that Capt. Lewis gave him his personal check to make up the balance amounting to 76.3 per cent, thus making it possible to liquidate every cent of the indebtedness.

The Lewis family recently disposed of its holdings in the Mitchell-Lewis Motor Co. to the Mitchell Motors Co.

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Swiss Exports Valued at $5,790,000 in 1915

BERNE, SWITZERLAND, July 26—Swiss automobile manufacturers closed the year 1915 with exports valued at $5,790,000. By weights the exports of 1915 exceeded those of the preceding year by over 100 per cent, and by value even a larger gain was made. Proportionally the Swiss automobile export industry, it is said, has increased at a greater rate than that of the United States.

Finished trucks and truck chasses formed the principal exports. The former export increased by more than 300 per cent and the latter by 100 per cent. They were sent largely to France.

The imports fell from 1,868,416 lb. to 571,438 lb. Among imported cars the American product is only slightly represented. But three American cars have been seen in this section during the past 6 months.

About 750 cars and trucks are imported annually. The most popular foreign car is the Fiat. Small 10 to 20 hp. five-passenger cars are in greatest demand.

Local automobile dealers declare that the absence of supply stations for American cars is the principal drawback to the sale of such automobiles here. Repairs under the circumstances are expensive.

At least two high-class cars are manufactured in the country, and in normal times these cars sell, even in France, in competition with French machines. The price of these Swiss cars usually is from $1,660 to $2,190, but 15 per cent increase has been exacted by the manufacturers since the war.

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Chiniquy Heads Kankakee Co.

KANKAKEE, ILL., Aug. 17—R. L. Chiniquy was elected president of the Kankakee Automobile Co., this city, at a meeting of the stockholders held this week. The other officers are: Vice-President, E. Betourne; treasurer, E. C. Chabot; secretary, O. L. Chiniquy; general manager, R. E. Parker. The directors are R. L. Chiniquy, E. Betourne, E. C. Chabot, R. E. Parker, and O. L. Chiniquy.

The company was incorporated for $500,000, and at the election it was reported that over $300,000 worth of stock had been subscribed for.

The plant is located on North Greenwood Avenue near the N. Y. C. tracks. A small six has been assembled and tested. A new model, a larger six, is being worked out in the shop.

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Brown Takes Lubricating Bolt

SYRACUSE, N. Y., Aug. 21—The Brown Co., this city, has taken an exclusive license to manufacture the automatic lubricating bolt recently patented by David Landau, New York, and H. G. Farr, Springfield, Mass. The lubrication is from a main reservoir wick of felt that is positively attached to a threaded cap plug with feed wicks.

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Dividends Declared

Edmunds & Jones Corp.: $1 per share on common, and quarterly of 1¾ per cent on preferred, both payable Oct. 2 to holders of stock Sept. 20.

Daily Market Reports for the Past Week

Material	Tues.	Wed.	Thur.	Fri.	Sat.	Mon.	Week's Ch'ge
Aluminum	.57	.57	.57	.57	.57	.57	...
Antimony	.10	.15	.15	.15	.15	.13	+ .03
Beams and Channels, 100 lb.	2.77	2.77	2.77	2.77	2.77	2.77	...
Bessemer Steel, ton	43.00	45.00	45.00	45.00	45.00	45.00	+2.00
Copper, Elec., lb.	.27	.27	.27	.27	.27	.27	...
Copper, Lake, lb.	.27	.27	.27	.27	.27	.27	...
Cottonseed Oil, bbl.	9.30	9.22	9.15	9.20	9.18	9.12	— .18
Fish Oil, Menhaden, Brown	.55	.55	.55	.55	.55	.55	...
Gasoline, Auto, bbl.	.23	.23	.23	.23	.23	.23	...
Lard Oil, prime	1.05	1.10	1.10	1.10	1.10	1.10	+ .05
Lead, 100 lb.	6.05	6.05	6.25	6.40	6.60	6.75	+ .70
Linseed Oil	.73	.73	.73	.73	.73	.73	...
Open-Hearth Steel, ton	45.00	45.00	45.00	45.00	45.00	45.00	...
Petroleum, bbl., Kans., crude	.95	.95	.95	.95	.95	.95	...
Petroleum, bbl., Pa., crude	2.30	2.30	2.30	2.30	2.30	2.30	...
Rapeseed Oil, refined	.90	.90	.90	.90	.90	.90	...
Rubber, Fine Up-River, Para	.66½	.67	.67	.67	.67	.67½	+ .01
Ceylon, First Latex, lb.	.56½	.57	.57	.57	.57	.58½	+ .02
Sulphuric Acid, 60 Baume	2.50	2.50	2.50	2.50	2.50	2.50	...
Tin, 100 lb.	39.25	39.00	38.87½	38.80	38.50	38.50	— .75
Tire Scrap	.05⅜	.05⅜	.05⅜	.05⅜	.05⅜	.05⅜	..

Ollier Taboos Factory Convention

In Favor of Getting Dealers Together in Their Own Territories Less Expense

DETROIT, Aug. 19—Shedding some new light on the matter of conventions of dealers, L. J. Ollier, vice-president and director of sales of the Studebaker Corp., who has just returned from a long trip to thirty-five of the leading cities in all sections of the country where he addressed conventions of the Studebaker dealers, says that the idea of holding one big convention at the factory each year is all wrong. This method of getting the dealers together is quite generally practiced, but Ollier's plan is to hold territorial conventions, where each man gets more individual attention and feels himself a bigger unit in the general assembly.

Ollier points out that if all the 6500 Studebaker dealers were to attend a big factory convention, the expense of bringing them in and entertaining them would be prohibitive. Of course, only a comparatively small proportion of them would attend, probably about 2000. A factory convention would therefore not be representative. A further difficulty is that those dealers who would attend would get lost in the shuffle, so to speak.

With the series of territorial conventions among dealers, it is entirely different. The dealers can afford to leave their business and travel 100 or 200 miles to attend a one-day convention at a branch, whereas they would not feel like traveling 1000 miles or more to go to the factory for a 3- or 4-day convention. At the district conventions, each dealer feels more important, and he gets a chance to talk with the factory officials and realizes his place in the general factory fabric. In a word, the territorial conventions are simply a means of attaining efficiency and reducing waste. They save time for the dealer at a period such as we are now experiencing when he is busy selling cars.

Studebaker, Ollier says, has never held a factory convention that was nearly so satisfactory, and practically every dealer in every district takes advantage of the territorial gathering and there is an element of personal contact that is impossible in annual factory affairs.

$150,000 Addition for National

INDIANAPOLIS, IND., Aug. 21—For the year ending July 1, National Motor Vehicle Co. sales increased more than 300 per cent.

Work has been started on the new $150,000 addition to the factory which made necessary the purchase of one-half a city block east of the present plant. Two new buildings are to be built at once. The new ground is 140 by 410 ft. Most of this ground has heretofore been occupied by one-story houses which must now give way for factory space.

The new building is to be 60 by 380 ft. and three stories high. It will be of reinforced-concrete and steel of the same general design and construction of the new National buildings which were built just 1 year ago.

The other new building will be 140 by 328 ft. and one story high. This building will be erected on the ground recently purchased.

More than 114,000 sq. ft. of floor space will be added to the National factory by the new buildings.

Fuller & Sons Output Increased

KALAMAZOO, MICH., Aug. 22—The new factory of the Fuller & Sons Mfg. Co., this city, is now completed and fully occupied. This company, which manufactures automobile parts and does a large business in transmissions, increased its output in July, 1916, 400 per cent over the same month last year. This output was nearly as great as the entire output of 1914. The production during the first 6 months of 1916 was 1 1/3 times greater than the entire year of 1915. To take care of this large increase in production, the company was forced to greatly increase the number of employees. At the end of July, 1916, the company had 250 per cent more men than in the corresponding month of 1915.

Overland Secures N. Y. Headquarters

NEW YORK CITY, Aug. 21—The Willys-Overland Co., which recently took control of its sales in this city by the establishment of temporary quarters at Columbus Circle, has leased the property at Broadway and Fiftieth Street belonging to the Wendell Estate. This building has remained vacant for 14 years. The Overland company will be the first tenant and will occupy the entire three floors and basement. The company has also opened a used car department at 1700 Broadway, near Fifty-fourth Street.

Trenton Plants Being Enlarged

TRENTON, N. J., Aug. 17—Trenton's manufacturing activity in the automobile industry is indicated by plant additions in course of construction or about to be erected at different establishments.

The Thermoid Rubber Co. has under way construction work designed to double the present capacity of the plant.

The Mercer Automobile Co. is erecting new buildings which will add nearly 100 per cent to its present output facilities.

In addition to other extensions made during the last year, the Ajax Rubber Co. has started work on a four-story steel and brick addition.

Saxon Employees Get Bonus

Will Turn Out Over 60,000 Cars for 1917—Contracts for 50,755 Closed

DETROIT, MICH., Aug. 21—The Saxon Motor Car Corp. will share a special bonus with its employees both in the office and factory departments, in accordance with a new plan just made public. This action is the result of the knowledge the Saxon officials have of the share the employees have in the success of any organization.

Office employees who have been with the concern for a period longer than 90 days will receive a bonus at the rate of 5 per cent of their yearly salary. Factory workers will share on a like basis, with the exception of those who have been paid a premium on the piece work basis. These will get a bonus of 3 per cent. The payment of this bonus will be made Sept. 1.

Although the Saxon organization has not decided upon a policy of bonuses each year, it is the intention, in years of prosperity, to pay some form of bonus as an appreciation of their services.

The idea is to get the employees interested in their work. and to build the best they can, for each step in manufacture is linked with the good-will of the men who actually do the manufacturing or fill the cogs in the industrial machinery.

DETROIT, MICH., Aug. 21—The Saxon Motor Car Corp. plans for an output for the 1917 selling year of more than 60,000 cars. Contracts for 50,755 cars have been closed within the past 3 weeks with Saxon dealers, and it is expected that the coming week will swell this to over 60,000. There is a definite monthly schedule of cars embodied in each contract which constitutes a bona fide order against which the concern can make shipments, which is a new feature for safety in dealer contracts. It is stated that Saxon is experiencing no let-up in the demand for its cars, and more orders for immediate shipment have been received since Aug. 1 than in any similar period in previous years.

Dodge Will Have Carpenter Shop

DETROIT, MICH., Aug. 21—The Dodge Bros. plant is to be enlarged by the addition of a five-story carpenter shop to cost $40,000 and measuring 240 by 40 by 80 ft., a six-story core shop to mean an outlay of $300,000 and having the dimensions of 425 by 60 by 105 ft., and another smaller building, one-story and 24 by 148 ft. Building operations on these will be started immediately.

Factory Miscellany

Superior Castings Plant Nears Completion—Work is being speeded on the erection of the plant of the Superior Steel Castings Co., Benton Harbor, Mich., whose main factory building will occupy a tract of land 138 by 200 ft. It is expected that the plant will be ready for occupation by Nov. 1. As the name indicates, the concern will manufacture steel castings.

No Homes for F. W. D. Employees—Because of the large growth of the business of the Four Wheel Drive Automobile Co., which has made it necessary to bring several hundred workmen to Clintonville, Wis., that city is confronted by a serious housing problem. To afford relief, business men have formed the Home Building Co., with $25,000 capital and will erect a large number of cottages, to be leased or sold practically at cost.

Case Issues New Shop Paper—The 5000 or more employees of the J. I. Case T. M. Co., Racine, Wis., are receiving the first issue of a new shop paper published at the expense of the company and distributed free to all members of the Case company. The paper is a monthly and much space is devoted to discussions of better shop practices, safety methods and topics bearing on the general welfare of the workers.

Rotary Engine Co. Starts Work—The Rotary Gas Engine & Pulverizer Co., which was organized recently at Antigo, Wis., with $25,000 capital, intends to engage at once in the manufacture of rotary gas and steam engines, tractors, transmissions for automobiles and other mechanical devices. The design is by Clarence Rishel, Denver, Colo., who has come to Antigo to take charge of the manufacture. For the present the production will be done under contract with local machine shops and foundries.

Continental Truck's New Plant—The Continental Motor Truck Co., Superior, Wis., has broken ground for its new $50,000 factory at Belknap Street and the Soo line tracks. The shop is to be ready Nov. 1, at which time the output of trucks will be largely increased. Dr. J. G. Barnsdale is general manager.

Boone Tire to Build—The Boone Tire & Rubber Co., Des Moines, Iowa, has practically concluded negotiations with the Business Men's Association to establish a branch plant in Beloit, Wis., to cost $25,000. The Iowa company is capitalized at $500,000 and operates a large tire and rubber works at Des Moines. This is overcrowded, however, and a branch plant must be provided. It is the intention of the company to build a plant.

Aluminum Co. Adds—The Werra Aluminum Co., Waukesha, Wis., which supplies numerous motor and automobile manufacturers with aluminum crankcases and other castings, is having plans prepared for a foundry addition, made necessary by the demand for its product.

Neverleek Co. Builds—F. S. Carr Co., Boston, Mass., maker of The Neverleek, is putting up two new buildings. The contract has been given and work will be started in Framingham at once.

Agnew Joins Chalmers—W. L. Agnew, who was the advertising manager of the Hudson Motor Car Co., Detroit, Mich., during the past 4 years, has joined the Chalmers Motor Car Co., where he will be connected with the sales promotion department.

Coey School to Build Plant—The Coey Auto School, 2010 South Wabash Avenue, Chicago, will build a one-story automobile factory to cost $50,000.

Chester County Motor Co. Moves—The Chester County Motor Co., Coatesville, Pa., will move to Philadelphia, Pa., where its plant will be located at Cherry Street, near Fifty-eighth Street. This company, of which J. E. Brinton is president, has been manufacturing a light gasoline commercial vehicle.

The Automobile Calendar

ASSOCIATIONS

Aug. 28-Sept. 1 — Milwaukee, Wis., Booster Tour of Milwaukee Automobile Dealers.

Sept.— Indianapolis, Convention for Formation of Indiana Automobile Trade Assn., under auspices of N. A. T. A., Hotel Claypool.

Oct. 2-5—St. Louis, Fall Meeting Assn. of Automobile Accessory Jobbers.

Oct. 2-7—Kansas City, Mo., Dealers' Show, American Royal Live Stock Show; Kansas City M. C. Dealers' Assn.

Oct. 13—Flint, Mich., Fall Meeting National Assn. of Automobile Accessory Jobbers.

Dec. 2-9—Electricians' Country-wide Celebration.

CONTESTS

Aug. 26—Kalamazoo, Mich., 100-Mile Track Race.

Sept. 1-2—New York, N. Y., Sheepshead Bay Speedway, 24-Hour Race, Trade Racing Assn.

Sept. 4—Elmira, N. Y., Track Race, Elmira Auto and Motorcycle Racing Assn.

Sept. 4—Cincinnati, Ohio, Speedway, Cincinnati Speedway Co.

Sept. 4—Newark, N. J., Track Race, Olympic Park, Racing Assn.

Sept. 4—Des Moines Speedway Invitation Race. Limited to six entries.

Sept. 4-5 — Spokane, Wash., Track Race, Inland Auto Assn.

Sept. 9—Indianapolis Speedway Race.

Sept. 16—Providence Speedway Race.

Sept. 18—North Yakima, Wash., Track Race, Washington State Fair.

Sept. 29—Trenton, N. J., Inter-State Fair. H. P. Murphy, Racing Sec.

Sept. 30 — New York City, Sheepshead Bay Speedway Race.

Oct. 7—Philadelphia Speedway Race.

Oct. 7—Omaha Speedway Race.

Oct. 14 — Chicago Speedway Race.

Oct. 19—Indianapolis, Ind., Race, Indianapolis Motor Speedway.

Oct. 21 — Kalamazoo, Mich., Track Races, Kalamazoo, Motor Speedway.

Oct. 22-23—Los Angeles, Cal., Commercial Car Reliability Tour.

Nov. 16 and 18—Santa Monica, Cal., Vanderbilt Cup and Grand Prix Races.

GOOD ROADS

Sept. 1-9—Cincinnati, Ohio, Good Roads Exposition and Convention, Music Hall, Hamilton County Dixie Highway Council of Cincinnati.

Sept. 6-7—St. Paul, Minn., Good Roads Congress, Auditorium.

SHOWS

Sept. 2-9—Cleveland, Ohio, Show, Industrial Exposition and Fair, Edgewater Park.

Sept. 2-9—Columbus, Ohio, Fall Show, Ohio State Fair, Columbus Automobile Show Co.

Sept. 4 - 8 — Hartford, Conn., Show, Connecticut Fair Assn.

Sept. 4-9—Minneapolis, Minn., Show, State Fair.

Sept. 4-11 — Indianapolis, Ind., Show, Indiana State Fair, Indianapolis Automobile Trade Assn.

Sept. 10-16 — Milwaukee, Wis., Show, Wisconsin State Fair, Machinery Bldg.

Sept. 25-30—Salem, Ore., State Fair, Joseph M. Rieg, manager.

Oct. 14 - 31 — Dallas, Texas, Show, State Fair.

Jan.—First Pan-American Aeronautic Exposition, New York City; Aero Club of America, American Society of Aeronautic Engineers, Pan-American Aeronautic Federations.

Jan. 6-13, 1917—New York City, Show, Grand Central Palace, National Automobile Chamber of Commerce.

Jan. 13 -20 — Montreal, Que., Show, Montreal Automobile Trade Assn.

Jan. 27-Feb. 3, 1917 — Chicago, Ill., Show, Colliseum, National Automobile Chamber of Commerce.

Feb.—Newark, N. J., Show, First Regiment Armory.

Feb.—St. Louis, Mo., Show, Auto Manufacturers' and Dealers' Assn.

Feb. 3-10—Minneapolis, Minn., Show, Minneapolis Automobile Trade Assn.

Feb. 26-March 3—Omaha, Neb., Show; Auditorium, Omaha Automobile Show Assn.

TRACTOR

Aug. 21-25—Bloomington, Ill., Tractor Demonstration.

Aug. 28-Sept. 1—Indiana Tractor Demonstration.

Sept. 4-8—Madison, Wis., Tractor Demonstration.

Sept. 11-16 — Milwaukee, Wis., Fall Show, Wisconsin State Fair, Milwaukee Automobile Dealers.

The Week in the Industry

Ramsden With Oakland.—J. M. Ramsden, formerly with the implement departments of the J. I. Case Plow Works, Racine, Wis., also the Moline Plow Co., and the Kingman Plow Co., is now a general traveler with the Oakland Motor Car Co., Pontiac, Mich.

French Bour-Davis Purchasing Agent—W. F. French has been appointed purchasing agent of the Bour-Davis Motor Car Co., Detroit. Mr. French is a newcomer in the automobile field, but has been associated in the mercantile and commercial fields in Chicago in a similar capacity.

Riess to Move Sept. 15 — Charles E. Riess, Hupmobile distributor in New York City, will move to 1741 Broadway about Sept. 15, at which address his organization will occupy all four floors. The service station, which will continue at 226 West Fifty-sixth Street, will be enlarged and improved.

Overland to Open Cafeteria — The Willys-Overland Co., Toledo, Ohio, will open a cafeteria about Sept. 1 for nearly 1000 office employees. The cafeteria will be opened simultaneously with the removal of the offices to the new seven-story office building, just completed, on the Boulevard, near West Toledo.

Mason Plant Leased by Ford—The old Mason Motor Car Co. plant, Des Moines, Iowa, has been leased as temporary headquarters for the Ford branch assembly plant for Iowa, which ultimately will be located in a new building at Eighteenth and Grand Streets. The old Mason plant has about 20,000 ft. of floor space.

Canadian Items — The Canadian Double Tread Tire Co., Vancouver, B. C., has removed to 1260 Granville Street.

The Vancouver Motor Co., Vancouver, B. C., has removed to 825 Pender Street.

J. H. Beaton, former assistant sales manager of the McLaughlin Co., Oshawa, Ont., has been appointed to the above position for all of Canada. This company trebled its output in 1916 and will double the output for 1917.

Bour Sells Advertising Interest—C. J. Bour, president of the Bour-Davis Motor Car Co., Detroit, and former head of the National Railway Advertising Co. of Chicago, has become so interested in the automobile business that he has disposed of his interests in the Chicago company. Mr. Bour will devote a great deal of his time to the automobile business, spending the weeks in Detroit and the week-ends in Chicago at his home.

Ohio News Items—The Central West Motor Car Co., Columbus, has taken the central Ohio agency for the Liberty car.

The Broad-Oak Automobile Co., Columbus, will act as central Ohio distributor for the Studebaker. The distribution of the Studebaker was formerly done by the Brasher Motor Car Co.

The Toledo Central Garage Co., Toledo, has purchased the stock of Oakland and Hollier cars from the Toledo Auto Sales Co., and will operate the business in the future.

The Kissel Service Co., Columbus, has taken a lease on a new building on the southwest corner of Spring and Fourth Streets, where the salesrooms and service station will be located.

Philadelphia Items—The Hawley Motor Co., 632 North Broad Street, increased its capital stock from $50,000 to $250,000.

C. W. Mann, for 10 years with the Buick Motor Co., Philadelphia, has opened a Buick agency at 322 West Main Street, Norristown, under the name of the Charles W. Mann Motor Co.

G. H. Patterson, formerly with Hurley & Early, Philadelphia, has been promoted to sales manager of the Lexington Motor Co., 150 North Broad Street. The latter, it is announced, will be in new, larger quarters by fall.

The Remey Motors Co. has been organized here by Robert Remey and A. P. Whitman, who will distribute the twelve-cylinder H-A-L in Pennsylvania, New Jersey, Maryland, Delaware, Virginia and West Virginia.

Northwest News—The Twin City Cord Tire Co., Minneapolis, has amended articles of incorporation permitting increase in capital to $250,000.

The Chevrolet Motor Co. of Minnesota, Inc., is the name of a new factory branch, Minneapolis, opened by the Chevrolet Motor Co. to give service, distribution and repair parts depot for Minnesota, North and South Dakota, western Wisconsin, Montana, Iowa, Nebraska and Wyoming. Address is Sixth Avenue South and Fourth Street.

The Goodrich Tire Co., 506 Andrus Building, Minneapolis, has begun construction of the first unit of a factory at Redwing, Minn. It will cost $75,000, will be three stories, 100 by 100 ft. The capital is $300,000. Officers are: President, H. Scott Ewers; secretary, F. E. Oberg; superintendent, H. J. Smith. The company will make tires and mechanical rubber goods.

New England Trade Items—Connell & McKone, Eastern Massachusetts dealers for the Overland, have opened a salesroom on Main Street, Worcester, Mass.

The Ford Motor Co. has opened its new branch at 75 Liberty Street, Springfield, Mass.

R. O. Spiller has been appointed manager of the Franklin Square Motor Car Co., Dover, N. H.

The Becker-Stutz Co. of Boston has leased a large building at Springfield, Mass., for its branch there.

F. H. Kenney, who has the Chalmers at Worcester, Mass., has moved into new salesrooms.

G. D. Niles has been appointed manager of the Boston branch of the Portage Tire Co.

W. C. Goodchild, formerly manager of the Metz company's branch at Providence, has been made manager of the Boston branch.

P. S. Clark, secretary-treasurer of the Rhode Island Automobile Dealers' Association, and formerly the Mitchell agent at Providence, has formed a new company to handle the Apperson automobile there.

The Pennsylvania Rubber Co. has moved its New England branch at Boston to a new structure on Beacon Street.

Frank Crockett, for a long time with the Knox company, has joined the Connell & McCone Co., to have charge of their Overland service station.

The big Overland service station at Portland, Me., was finished last week, and a similar one is to be built at Bangor.

J. W. McGuire, Pierce-Arrow dealer at Boston, Mass., has had a set of plans drawn for a service station that will cost more than $100,000.

Alvan T. Fullerr, who has the Packard agency for Eastern New England, has just signed a contract for an addition to his mammoth service station in Boston, Mass., that will be a duplicate of the present one. It will be connected with the other by a bridge of U shape, leaving an 80-ft. court between the two buildings. The additional structure will give him 150,000 additional sq. ft. of floor space, and make it what is claimed to be the largest plant in the country controlled by one dealer. The first floor of the new building will be for the used cars, and the rest for a service station. The cost will be about $250,000, making the total plant worth more than $500,000.